final environmental impact statement

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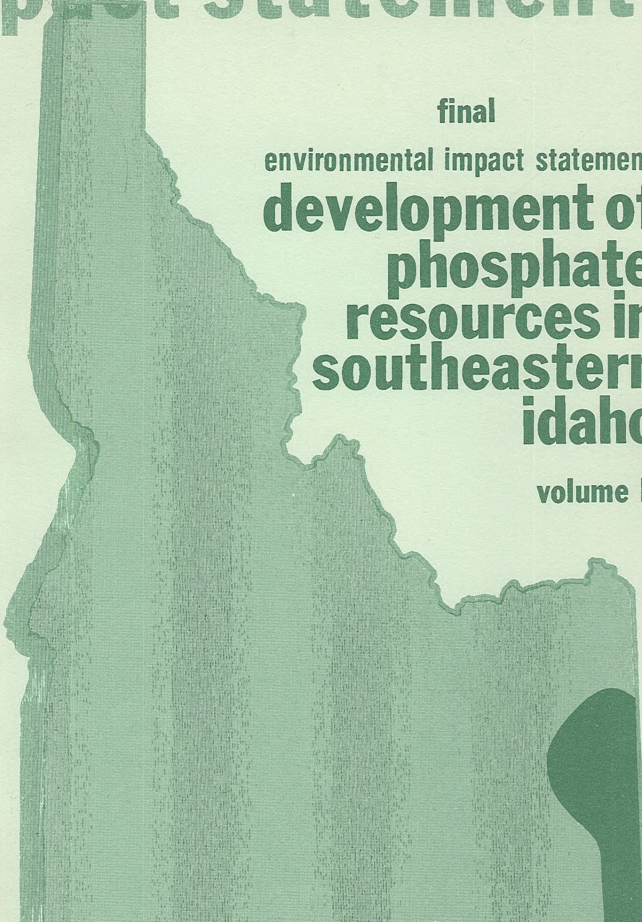
environmental impact statement

development of phosphate resources in southeastern idaho

volume II



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ENVIRONMENTAL IMPACT STATEMENT

VOLUME II

DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO

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PART 4

ALUMET GROUP

The Alumet Group, an association of Earth Sciences, Inc., National Steel Corporation, and South Wire Company, proposes three surface mines for the production of phosphate rock. The proposed Diamond Creek and Swan Lake Gulch mines involve Federal leases; the proposed Lanes Creek mine does not, so it is not described in this impact statement. The mines will all be in Caribou County near Soda Springs. They will be developed sequentially at an expected production rate of 2.5 million tons per year. According to the proposed mining schedule, the Diamond Creek mine will begin operations during 1977 and will produce beyond the year 2000, when 60 million tons of ore will have been produced. The proposed Lanes Creek and Swan Lake Gulch mines are not scheduled for production before the year 2000.

The ore from the three mines will be beneficiated at a mill to be constructed near Diamond Creek. The beneficiated phosphate rock will be transported by rail to a proposed alunite mine and processing-plant complex in southwestern Utah, where phosphate fertilizer products will be manufactured utilizing the 1,500 tons per day of sulfuric acid to be produced in the alunite processing plant.

In a letter to the Task Force dated December 7, 1976, Alumet stated that it plans to build a dry-process beneficiation plant. Although the plant will likely produce slightly more particulates than the wet process, particulates will still be well below Class II standards on the Alumet properties, and will meet Class I standards off the properties. There will be no wastewater discharge and no tailings ponds. However, because the initial plans submitted to the Task Force proposed wet-process beneficiation, both are discussed in this statement.

In April 1977, Alumet stated that it now plans to proceed with mining of phosphate from its non-federal bases in the Diamond Creek area at the rate of 0.5 million tons per year, starting in 1977. According to Alumet, it has from 12 to 19 years of reserve on these patented claims, and all necessary State permits have been obtained. The ore will be hauled by truck from the Minisite on the county road through the Blackfoot Narrows to the rail spur now serving the existing Wooley Valley mine.

PART 4.1
DIAMOND CREEK MINING PLAN

CHAPTER I
DESCRIPTION OF PROPOSED ACTION

The Diamond Creek minesite is in the south end of Upper Valley in the Diamond Creek drainage, about 28 miles northeast of Soda Springs (figs. 4-1, 4-2). The surface of the 185 acres of lease I-014914 are privately owned. Of the 360 acres in lease I-014959, 40 acres of the surface are privately owned and 320 acres are Caribou National Forest lands. As an essential part of the proposed mine, Alumet has applied for 650 acres of fringe acreage.

The revised mining plan as submitted, does not contain sufficient engineer details for final consideration of approval or disapproval under Federal Regulations CFR 231. The following details are lacking at this time and will be required for final consideration.

1. Typical cross sections are not related to the proposed pit.

2. Drill hole locations and cross sections on 500-foot centers along the length of the pit are not identified.

3. Locations of the proposed drawdown wells, pipe system and manner of disposing of this fluid are needed.

4. A topographic map, representative of the "lake" with sections showing highwall, benches, and foot wall is needed.

5. Location and size of a blending and gurge pile for mill feed storage are not identified.

6. The manner of disposing of tailings or rejects into the mine waste is not identified.

The following information is from the revised mining plan submitted to the Conservation Division, U. S. Geological Survey, Pocatello, Idaho, on July 10, 1976, the orginal mine plan submitted on December 4, 1974, from the lessee's environmental assessment, prepared by VTN Corporation; from an environmental report prepared by Greiner Environmental, and from interviews with Alumet personnel.

A. PROPOSED MINING OPERATIONS

There has been no previous mining on the leases or fringe acreage. Prospecting and development were done by the original lease holders.

Mining will proceed southeastward along the trend of the Meade Peak, which strikes generally northwest-southeast and dips 30° E. at the northwest end; dips gradually increase southeastward, where they are

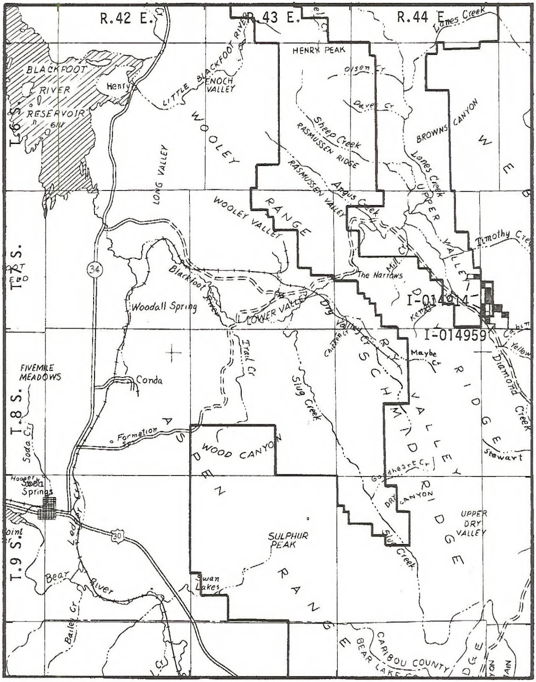

Figure 4-1.--Location of Federal phosphate leases and pending fringe acreages (patterned) for the proposed Diamond Creek mine.

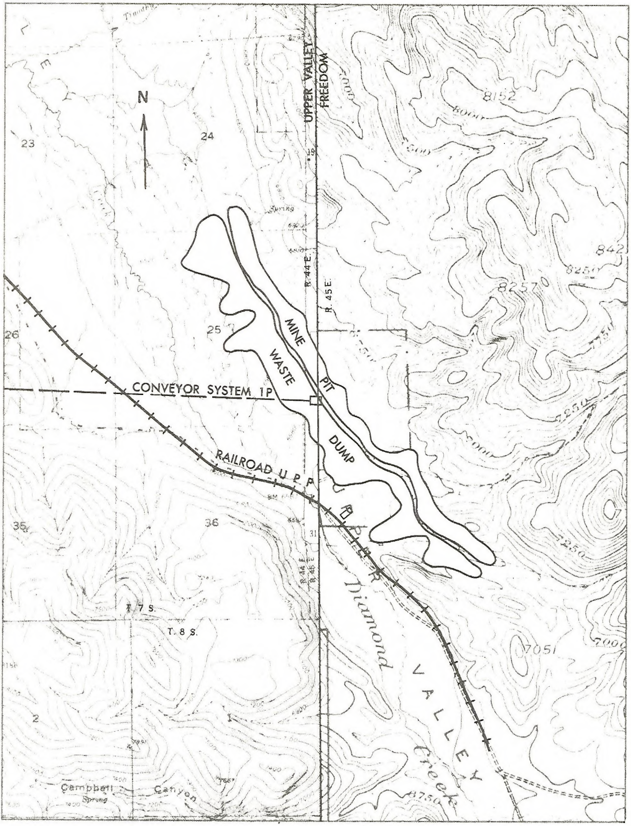

Figure 4-2.--Mining plan proposed for the Diamond Creek site.

variably steepened by faulting. Two separate zones totaling 59 feet thick will be mined in successive 1,000-foot-long panels from the 177-foot-thick Meade Peak Member. The middle waste and two thin internal waste zones in the lower phosphate zone will be rejected. The active pit will be 450 to 750 feet deep (figure 4-3).

Mining will proceed in two stages: from 1977 to 1980 in altered ore at a 3.4:1 average stripping ratio, and from 1981 on at a 10.4:1 average stripping ratio. These stripping ratios are expressed as cubic yards of overburden to cubic yards of ore, in contrast to the usual ratio of cubic yards of overburden to tons of ore.

The rock will be mined from the surface using dozers and scrapers to extract ore and remove waste. In the first mining stage (3.4:1 pit), scrapers will follow a load-haul-dump cycle over one-way roads, forming a closed loop. Topsoil and waste will be placed in dumps immediately southwest of the pit. In the second mining stage (10.4:1 pit), a scraper haul-back method will be used, in which scrapers follow two-way haul roads, and dozers place all but initial pit waste as backfill in previously mined pits. With the sequential cut-and-fill method employed during the final stage, an open pit will ultimately be left at the southeastern end of the property to become a lake.

According to the environmental assessment, eight boreholes, each 900 feet deep, will be drilled along the east side of each panel; each will be pumped at a rate of 150 gpm (gallons per minute), for a total pumpage of 1,200 gpm per panel. The mining plan estimates that an additional 470 gpm of water will seep into each panel of the pit. This water will be collected in a sump and pumped into ditches, which will carry it into two settling ponds. The ponds will also be used to trap sediment in surface runoff; the cleared water will be decanted from the ponds and either released into Diamond Creek or reinjected in wells.

A blanket of Rex Chert will form the foundation of the dump and act as a French drain to accommodate the flow of streams crossing the proposed pit area, to prevent erosion, and to recharge the groundwater system under the fill. The plans indicate that as much as 542 cubic feet per minute of runoff may discharge onto the proposed pit area during snowmelt. During the life of the mine, this runoff will be carried away from the active panel in diversion ditches. After reclamation, the water will be directed into the French drains, which, according to the submitted mining plans, have a capacity of 1,900,000 cubic feet (44 acre-feet).

The plan does not provide for stockpiling of marginal grade phosphate ore.

Revision of mining plans submitted on July 10, 1976, while retaining the major features of the original plan, incorporates a significant change in procedure. Where the original plan called for mining the full length of the orebody at a low stripping ratio, with all of the waste going to external dumps as a first phase, followed by a second phase with a high stripping ratio and most of the waste going as pit

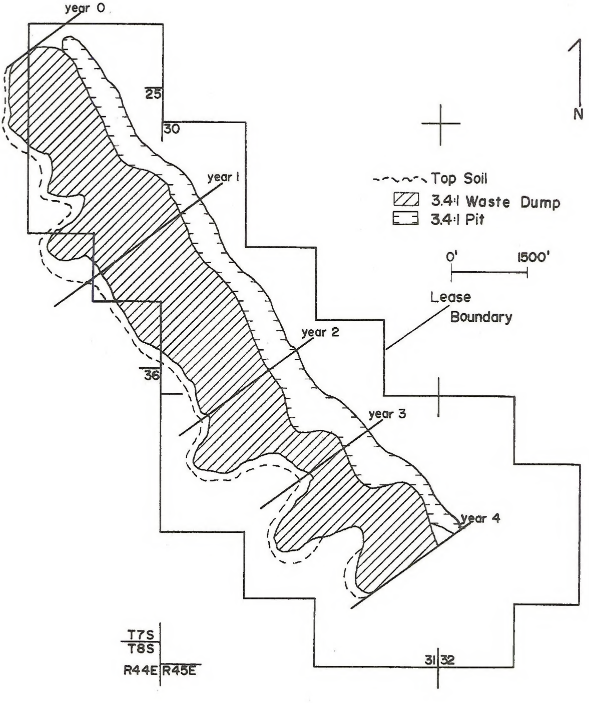

Figure 4-3.--Mining sequence proposed for the Diamond Creek mine.

backfill; now all of the waste from the initial mining will go to external dumps with shallow and deep mining being done concurrently. After the initial mining period during which adequate mining space is created, all of the waste will be placed as pit backfill. A large portion of the external dump will be rehandled later and placed as pit backfill. This necessitates twice disturbing and rehabilitating of about 208 acres of dump site, which, in turn, accounts for the major difference in disturbed areas between the two plans. The new plan would have a reasonably uniform stripping ratio, a desired uniform blend of near surface and deep ore, and a lesser net disturbed area exposed at any one time.

Recent communication with Alumet indicates a dry beneficiation process, with the tailings being disposed with a mine waste. No separate tailings disposal area will be required.

B. RECLAMATION

Topsoil will be placed in storage piles northeast of the pit and southwest of the dumps for later use in reclamation.

Waste from the first (3.4:1 stripping ratio) stage will be placed southwest of the panel from which it was excavated. Waste from the first cut of the second (10.4:1 stripping ratio) stage will be placed northeast of the pit; the rest of the waste from the second stage will be used to backfill the pit. Ultimately, the pit will be backfilled, except for the final southeast panel, which will be filled with water to form a lake termed "Diamond Lake."

All dumps will be compacted with loaded scrapers as they progressively build up the dump. Dump faces will be graded and contoured to blend with the natural topography; then they will be fertilized, soil-amended, seeded, and planted. Of the total 1,195 acres, including fringe acreage, 664 acres will be disturbed by mining and reclaimed.

C. SURFACE FACILITIES

Surface facilities indicated in the mining plan include haul roads, access roads, mine-support facilities, a proposed railroad spur, powerlines, well-pumping facilities, and waste-treatment facilities.

The main access road extends along the southwest limit of the pit, outside the proposed dump. The pit will be served by one-way haul roads. Ore will presumably be hauled from the southwest side of the pit to a nearby railhead; a conveyor system from the mine pit to railhead has been proposed as an alternative. Neither system is detailed in the plan.

No new roads will be required for access. The existing road, particularly through the Blackfoot Narrows, will require widening and heavy-duty conditioning to accommodate traffic. Four alternate rail routes are being considered; these are discussed in detail in Part 3.

A new rail spur is proposed as an extension of the existing railroad into Dry Valley. The primary proposed route would pass through the Blackfoot Narrows and then southeast to the property. A proposed alternate route would extend the existing Dry Valley railroad northeast across Dry Ridge, with a maximum grade of 2 percent. Recent (December 1975) company information indicates that a rail route through Enoch Valley is more feasible.

The company's primary route for the high-voltage powerline is either through the Blackfoot Narrows from Beker's Dry Valley mine or from Afton, Wyo., through Smoky Canyon to Diamond Creek and then northward to the minesite (map 13). Alternatively, the powerline may be extended across Dry Ridge from Dry Valley.

Mine-support facilities include buildings, parking lots, equipment yards, guardhouse, and fuel-storage, and waste-treatment facilities, but these are not completely described in the plan. All stockpile, processing, mining and haulage areas will be fenced.

Two 10-acre settling ponds are planned, one southeast of the pit and the other to the northwest. The latter is the main settling pond, having a maximum inflow of 7,000 gpm..

Alumet plans to build a beneficiating plant near the minesite in 1977; its location is not specified, but it will be off the Federal leaseholds. The plant will operate continuously. According to Alumet, about 112 acres will be required. About 840 acres will be used additionally for tailing ponds during the life of the mine, if a wet process is used. These ponds will be used in about 20-acre increments with no more than 40 acres in active use at any time. However, Alumet has indicated it now plans dry beneficiation. Revegetation will follow closely upon completion of use of each area. The plant will occupy about 112 acres and will be in operation for the life of the Diamond Creek mine. Operation also will likely continue for two subsequent mines. The company plans to dismantle the plant and rehabilitate the area when the plant's useful life is done.

CHAPTER II
DESCRIPTION OF THE EXISTING ENVIRONMENT

A. NATURAL ENVIRONMENT

1. CLIMATE

The general climate of the area is described in Part 1. Average temperatures at the minesite are probably a few degrees cooler and growing seasons are shorter than those at Conda and Afton. Precipitation is not known, but its distribution is probably similar to that in Dry Valley (Part 5.1). Patterns of drifting snow are difficult to predict from available data.

2. LAND RESOURCES

a. Land Surface

The Diamond Creek minesite is along small northwest-trending spurs at the base of the Webster Range and slightly above the floor of southern Upper Valley, and about one-half mile east of Diamond Creek (fig. 4-2). The relief between Diamond Creek and Diamond Peak, about 4 miles east of the creek, is about 2,160 feet. Dry Ridge, west of the broad alluvial valley of Diamond Creek, rises to over 8,500 feet.

b. Geology and Mineral Resources

The Phosphoria Formation strikes northwest and dips 30° to 70° east into the Webster Range. The Diamond Creek mine is on the east limb of the Snowdrift anticline and on the up-thrown block of the Upper Valley fault. The outcrops at the northern end of the minesite are enclosed by alluvium and hill wash. The thickness of sediment in Upper Valley, estimated from regional gravity data, amounts to about 1,000 feet.

The Meade Peak Member is 177 feet thick, and the lower and upper ore zones total 59 feet. Production of 57.5 million short tons of ore is planned to the year 2000. Estimates of the total resources of potentially recoverably elements in the ore are: 1.4 million short tons of fluorine, 6,300 short tons of uranium, 46,000 short tons of vanadium, and 58,000 short tons of rare earths.

c. Soil

The following landtypes occur on the leaseholds and fringe acreages:

Landtype	Area (acres)
11	135
14	110
15	260
33	350
41-1	140
56	100
56-1	100

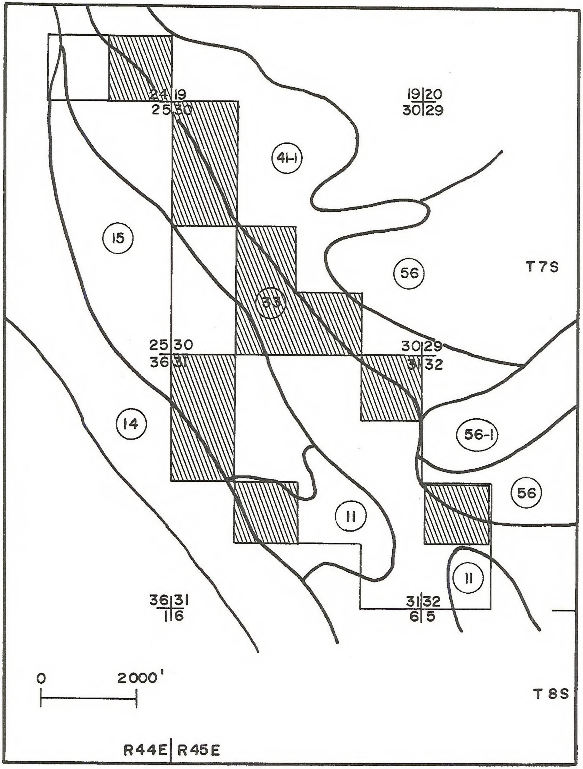

Figure 4-4.--Landtypes near the Diamond Creek site. Patterned area shows fringe acreage.

Table 4-1.--Physical characteristics of soils at Diamond Creek minesite. VL = very low, L = low, M = moderate, H = high, VH = very high

Land-type	Soil families	Percent of area	Erosion in inches per year	Topsoil potential		Avail-able water capacity	Mass fail-ure hazard	Road construc-tion hazard	Slope range, in percent	Revege-tation poten-tial
				Depth in inches	Suit-ability					
11	Cryic Pachic Paleoborolls, fine-loamy, mixed	100	0.004	12	H	9.6	VL	VL	10-20	VH
14	Argic Cryaquolls, fine-loamy, mixed	50	.000	10	L	4.0	VL	M	0-1	H
	Cumulic Cryaquolls, fine-loamy, mixed	50	.000	15	L	3.7	VL	L	0-2	VH
15	Cryic Paleoborolls, fine-loamy, mixed	50	.001	8	H	7.4	VL	L	1-5	VH
	Pachic Cryoborolls, loamy-skeletal, mixed	50	.001	12	H	4.3	VL	L	1-10	VH
33	Argic Cryoborolls, fine-loamy, mixed	20	.024	8	L	6.0	M	H	40-60	M
	Lithic Cryoborolls, loamy-skeletal, mixed	30	.025	4	L	3.4	L	M	20-50	L
	Typic Cryoboralfs, fine-loamy, mixed	15	.008	8	H	5.9	VL	M	20-40	M
	Argic Pachic Cryoborolls, fine-loamy, mixed	25	.017	10	H	9.6	VL	M	30-40	M
	Typic Cryorthents, coarse-loamy, mixed	10	.010	6	M	3.6	VL	L	30-50	L

Table 4-1.--Physical characteristics of soils at Diamond Creek minesite--Continued

Land-type	Soil families	Percent of area	Erosion, in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road construction hazards	Slope range, in percent	Revegetation potential
				Depth, in inches	Suitability					
41-1	Calcic Cryoborolls, loamy-skeletal, mixed	75	0.041	6	L	4.6	M	H	40-60	VL
	Lithic Cryoborolls, loamy-skeletal, mixed	15	.052	6	M	3.4	L	VH	20-30	VL
	Mollic Cryoboralfs, loamy-skeletal, mixed	5	.017	8	L	8.8	L	M	50-60	M
	Argic Pachic Cryoborolls, loamy-skeletal, mixed	5	.010	12	M	5.7	M	M	35-45	H
56	Argic Cryoborolls, loamy-skeletal, mixed	40	.068	8	M	4.5	L	M	50-65	M
	Calcic Cryoborolls, loamy-skeletal, mixed	40	.143	8	L	4.6	M	M	60-70	L
	Mollic Cryoboralfs, fine-loamy, mixed	20	.063	8	H	7.2	L	M	30-50	L
56-1	Typic Cryorthents, loamy-skeletal, mixed	60	.019	4	L	5.2	L	H	25-60	M
	Argic Cryoborolls, fine-loamy, mixed	35	.017	8	M	6.0	M	H	25-60	M
	Lithic Cryoborolls, loamy-skeletal, mixed	5	.111	4	L	3.4	L	M	50-60	L

Figure 4-4 shows the distribution of landtypes at the minesite, and table 4-1 gives the characteristics of the soil families in each landtype.

Landtype 11 occurs on east and west aspects of slopes. This landtype consists of gently sloping, complex, slightly concave toeslopes that occur at the sides of the valleys. The landforms are of alluvial-colluvial origin and include both individual fans and coalescing fans of deep alluvial-colluvial outwash from mixed formations. Bedrock is deeper than 15 feet throughout most of the unit. The soils are deep loams, and the substratum consists of several feet of gravelly and loamy alluvium or colluvium.

Landtype 14 occurs on all aspects of slopes. This landtype consists of valley floodplains having shallow water tables. Deep alluvial outwash dominates the landtype, and hard bedrock is deeper than 25 feet. The soils are deep, silty clay loams that are developing in alluvial outwash. The substratum is many feet of gravelly and cobbly alluvium derived from sandstone, shale, limestone, and quartzite.

Landtype 15 occurs on all aspects of slopes. This landtype consists of old dry floodplains of the larger stream courses. The landforms consist of slightly concave to slightly convex alluvial bottom lands of alluvium derived from a wide variety of parent material. A few isolated springs or seeps occur near the base of the valley sides in the intermittent stream channels. The soils are moderately deep to deep loam and clay loam developing in valley-fill alluvium. The substratum is alluvium of mixed origin and some alluvium-colluvium.

Landtype 33 occurs on all aspects of slopes. This landtype consists of mature topography with low relief and valley sides with complex slopes between Yellowjacket and Timber Creeks. The drainage pattern ranges from weakly dendritic to parallel. The slopes are structurally controlled. The soils range from very shallow to very deep, and textures are fine to coarse-loamy and mixed. The soils of this landtype are generally deep loams but are the most complicated in the entire area. Depth to bedrock ranges from less than 20 inches to over 60 inches.

Landtype 41-1 occurs on south and west aspects of slopes. This landtype consists of dissected escarpments of high relief. The slopes are slightly concave to slightly convex, range from 500 to 2,500 feet in length, and are dissected by parallel drainage. Rock outcrops are common on the dissected escarpments. Soils are typically moderately deep to deep, loamy-skeletal, and mixed. Depth to bedrock ranges from 10 to 60 inches.

Landtype 56 occurs on south aspects of weakly dissected, broken slopes. The slopes are slightly convex to slightly concave, and their lengths range from 500 feet to 5,000 feet. Streams are generally present in the canyon bottoms. Soils are moderately deep, loamy-skeletal, mixed (80 percent of the landtype) and very deep, fine, montmorillonitic (20 percent of the landtype). Average depth to bedrock ranges from 2 to 3 feet over 80 percent of the landtype and from 3 to 5 feet over 20 percent of it.

Landtype 56-1 occurs on north aspects of weakly dissected, broken, scarp slopes. The slopes are steep. Streams are generally present in the canyon bottoms. Soils are generally moderately deep with loam surfaces over gravelly loam or clay loam subsoils. Average depth to bedrock ranges from 2 to 3 feet.

3. WATER RESOURCES

a. Water Supply

1. Surface Water

The drainage directly into the pit area of the mine comes from about 3.4 square miles of slopes that rise to an elevation of about 8,400 feet. The annual precipitation of about 28 inches, if evenly distributed, would yield about 12 inches of runoff. Because of drifting of snow, actual runoff is unknown.

The drainage area of Diamond Creek, a perennial stream, above the proposed mine is about 52 square miles; few flow data are available. Estimates of flow based on records for nearby streams indicate the 50-year flood in Diamond Creek may be near 900 cfs (cubic feet per second). Several springs are indicated in the area, but no data are available on their characteristics.

2. Ground Water

For the Diamond Creek area, data available in October 1975 suggest that the Dinwoody Formation, exposed mostly east of the proposed mine pit, and the alluvium that floors Upper Valley west of the pit, contain the most water. However, test holes drilled into the Rex Chert and the upper part of the Meade Peak also obtained water. Several springs emanate from the Dinwoody at its contact with the underlying cherty shale member of the Phosphoria.

According to the Idaho Bureau of Mines and Geology, an exploratory hole drilled a few yards from Diamond Creek indicates that the ground-water level in the alluvium is about 30 feet below the land surface and that the alluvium is fairly impermeable to a depth of about 70 or 80 feet where there is a permeable horizon. Another test hole drilled into the Wells Formation near the site of the proposed pit was practically dry, suggesting that the Lanes Creek fault may bar the eastward movement of water from the alluvium into formations east of the fault. However, the hydraulic gradient caused by the greatly different water levels on opposite sides of the fault would be accentuated by a pit several hundred feet across. The fault may accentuate or cause water to move from the alluvium across the fault and into the pit. The fact that the Wells contains little if any water suggests that water does not move downward through the lower part of the Meade Peak and into the Wells Formation.

b. Water Quality

Data for Diamond Creek, include partial chemical analyses of samples collected above the confluence with Stewart Creek, about 6 miles upstream from the proposed mine. The samples collected from August 19 to September 3, 1974 represent low-flow conditions; those collected from May 21 to July 9, 1975 represent spring runoff.

Parameters	Range in Values Aug.-Sept. 1974	May-July 1975
Number of measurements	3	11
Instantaneous discharge (cfs)	0.2-0.7	See below
Hardness as $CaCO_3$ (ppm)	168-170	114-162
Total Kjeldahl nitrogen as N (ppm)	2.7-2.8	1.4-2.5
Total phosphate as P (ppm)	0.08-0.14	0.07-0.17
Suspended sediment (ppm)	1-6	2-126

Data on four of the 11 samples collected during spring runoff are summarized below:

Date	Discharge (cfs)	Suspended sediment (ppm)
May 28, 1975	80	18
June 10, 1975	45	84
June 17, 1975	50	80
July 2, 1975	22	66

Trace elements (total), are given below for low-flow conditions (0.4 cfs), when the suspended sediment was 2 ppm, and during spring runoff (80 cfs), when it was 18 ppm.

	August 26, 1974	May 28, 1975
	(micrograms/litre)	
Arsenic	0 1/	0
Cadmium	0	0
Chronium	2	3
Copper	5	4
Selenium	0	10
Vanadium	0	31
Zinc	2	29

1/ All concentrations recorded as 0 are less than detectable amounts.

The data are for unfiltered and acidified samples, so they represent that part of the element adsorbed to particulate material as well as that dissolved.

Measurements of other parameters in addition to those cited above were made in 1974 and 1975 for water from Diamond Creek and nearby Stewart and Kendall Creeks. The data are listed in Part 1.

Water quality measurements made on seven creeks in the Diamond Creek Project area between September 1975 and January 1976 by Greiner Environmental are summarized in table 4.1a. The water is a calcium-magnesium -bicarbonate type with moderately low sulfate and low sodium, potassium and chloride. Ground-water analyses from six wells in Diamond Creek Valley (Table 4.1a), contained very similiar concentrations for the major cations and anions. Surface water samples collected in the fall and early winter are primarily groundwater recharge and the chemical similarity to groundwater confirms this source.

Lead, manganese, and selenium malimum observed concentrations in ground water in the Diamond Creek Valley exceeded EPA recommended drinking water criteria. These high metal concentrations occurred in two wells finished in the Rex Chert immediately above the Meade Peak, and are stabably related to dissolution.

Data for turbidity and suspended sediment for Stewart Creek are summarized on p. 1-126. Data are on file (Forest Service) for 27 samples for Diamond Creek (including those shown here) and for 41 samples for Stewart Creek. The data include analyses for stream discharge, turbidity, suspended sediment, dissolved solids, total alkalinity, total hardness, total phosphorus, total kjeldahl nitrogen, and water temperature. In addition there are lesser numbers of determinations for dissolved phosphorus, nitrate, nitrite and pH. Most of these data are not shown in this report but were considered in making the interpretative statements about stream water quality.

The Idaho Division of Environment plans a water quality and stream quality survey for Diamond Creek. The survey will include comprehensive chemical analyses and benthic populations inventories.

4. AIR RESOURCES

The present air quality near the minesite is good. Minor amounts of dust and vehicle emissions occur along the unpaved roads.

Ambient air quality measurements at the plant site location in Diamond Creek were made by Greiner Environmental between August 1975 and February 1976. A summary of the observed data is listed below.

	Sulfur Dioxide Daily Averages in PPM			Particulates Daily Averages in ug/m^3		
	Minimum Monthly	Maximum Monthly	6 month Average	Minimum Monthly	Maximum Monthly	6 month Average
Diamond Creek	0.0024	0.0102	.0066	14.1	98.9	43.4
National Air Quality Standards	.14 ppm/24 hr. Maximum			150 ug/m^3/24 hr. Maximum		

Table 4-1a.--Water Quality in the Diamond Creek Project area, collected by Greiner Environmental.

Parameter	Units	SURFACE WATER Samples	SURFACE WATER Minimum	SURFACE WATER Maximum	GROUND WATER Samples	GROUND WATER Minimum	GROUND WATER Maximum
Aluminum	ug/l	29	100	300	9	100	300
Bicarbonate Alkalinity	mg/l	26	158	207	9	161	211
Biochemical Oxygen Demand	mg/l	6	0.8	2.6	-	-	-
Calcium	mg/l	29	48	62	9	47	65
Carbonate Alkalinity	mg/l	26	0	48	9	0	0
Chemical Oxygen Demand	mg/l	26	5	29	9	5	74
Cloride	mg/l	29	0.73	4.0	9	1.38	8.6
Chromium	ug/l	16	10	10	9	10	20
Fecal Coliform Bacteria	#/100ml	6	0	0	-	-	-
Total Coliform Bacteria	#/100ml	11	0	0	-	-	-
Conductivity	umhos/cm	23	173[a]	437	-	-	-
Copper	ug/l	23	40	20	9	40	20
Fluoride	mg/l	29	.11	.31	9	.06	.20
Iron	ug/l	28	40	430	9	10	60
Lead	ug/l	27	40	50	9	50	70
Magnesium	mg/l	29	7.7	17.2	9	4.6	25
Manganese	ug/l	28	10	80	9	10	160
Molybdenum	ug/l	27	50	80	9	30	400
Nickel	ug/l	24	10	40	9	20	180
Nitrate + Nitrite	mg/l as N	22	.02	1.62	9	.02	1.83
Kjeldahl Nitrogen	mg/l as N	17	.2	1	-	-	-
Organic Carbon	mg/l	26	1	4	-	-	-
Oxygen, dissolved	mg/l	15	7.1	9.5	-	-	-
pH	pH units	26	6.3	8.4	-	-	-
Orthophosphate, dissolved	mg/l	23	.01	.04	9	.01	1.3
Total Phosphorus, dissolved	mg/l	22	.01	.04	9	.01	7.9
Potassium	mg/l	29	.09	1.27	9	.36	12.2
Gross Alpha Radiation	picocuries/l	9	0.4 ± 1.0	2.7 ± 1.3	6	0.0 ± 0.4	0.1 ± 0.5
Gross Beta Radiation	picocuries/l	9	0 ± 6	0 ± 7.1	9	0 ± 10	9 ± 10
Selenium	ug/l	-	-	-	9	2	34
Silcon	mg/l	29	2.3	5.3	9	3.1	7.4
Sodium	mg/l	29	2.9	5.9	9	3.2	9.9
Total Dissolved Solids	mg/l	26	149	271	9	182	252
Suspended Solids	mg/l	13	.5	4	-	-	-

Table 4-1a.--Water Quality in the Diamond Creek Project area, collected by Greiner Environmental.
continued--

Parameter	Units	SURFACE WATER Samples	SURFACE WATER Minimum	SURFACE WATER Maximum	GROUND WATER Samples	GROUND WATER Minimum	GROUND WATER Maximum
Sulfate	mg/l	29	7.1	24.8	9	0.5	35.2
Sulfide	mg/l	6	-	.04	-	-	-
Temperature	°C	14	2	6	-	-	-
Turbidity	JTU	8	9	19	-	-	-
Vanadium	ug/l	-	-	-	9	50	80
Zinc	ug/l	25	5	65	9	5	34

[a] unconfirmed

Sulfur dioxide concentrations are very low reflecting natural background conditions of the area. The high monthly 24 hr./average particulates of 98.9 ug/m^3 occurred in October when vehicular traffic related to hunting is at a maximum.

5. VEGETATION

The leaseholds and fringe acreages include about 422 acres of conifer-aspen (including 45 acres of timber), 12 acres of mountain brush cover, and 486 acres of sagebrush-grass. Forage production is 600 to 2,300 pounds air dry weight per acre. The timber is uneconomical to harvest.

Bark beetles have killed about 25 percent of the pine trees in Diamond Creek drainage.

No rare or endangered plants are known on the minesite.

6. WILDLIFE

Terrestrial wildlife, especially elk, mule deer, moose, coyote, beaver and large raptors, are numerous on and around the site. Common species generally present in the area are listed in Part 1, Chapter II. About 60 species of mammals occur or may occur in the area.

The area supports elk year-round and is a key elk wintering and calving area (map 8). Winter trend counts and calving ground counts by the Idaho Fish and Game Department in 1973 indicate there has been an increase in usage of the area by elk in recent years, particularly along the east side of the valley. As many as 50 elk may use the area. The mountain-brush habitat is used during the winter, the aspen-sagebrush during the calving season of May and June. During the rest of the year, elk move throughout the valley.

The area supports mule deer except during the winter, when most of the deer migrate northward or westward out of the valley. About 100 deer use the area on and near the leasehold.

Moose inhabit the area throughout the year. About 15 to 20 winter in the willow bottoms along Diamond and Yellowjacket Creeks. The moose move regularly between drainages, but no data are available on their exact seasonal movements or where they calve.

Black bear frequent the site, but no information is available on their numbers or activities.

Predators on or near the site include numerous coyote, and occasional bobcat, red fox, and mountain lion; their numbers are unknown. Beavers have been abundant on Diamond and Yellowjacket Creeks in the past. The presence of newer, smaller dams, and food caches, indicate that a substantial number still reside in the area, most of them on lower Diamond Creek.

Mountain cottontail is the only small-game mammal on the site. Non-game mammals include snowshoe hare, muskrat, porcupine, deer mouse, badger, weasel, and other rodents.

Ducks, Canada geese, and greater sandhill cranes occupy the area during spring, summer, and fall. They nest around beaver ponds and other marshy areas in the Diamond Creek drainage. In 1975, the Idaho Fish and Game Department counted 6 nesting pairs of Canada geese along Diamond Creek.

Sparrow hawk, goshawk, marsh hawk, golden eagle, red-tailed hawk, and several species of owls are common. The less common goshawk is a resident of the area; it is especially susceptible to human activity. A number of amphibians and reptiles are also prevalent.

According to the Idaho Fish and Game Department, peregrine falcons have been observed at the leasehold, and suitable whooping crane habitat is present in nearby Diamond Creek. The peregrine falcons, however, do not nest on the leasehold.

7. FISHERIES

There are no fisheries on the leasehold.

Diamond Creek contains cutthroat trout (native and Henry's Lake variety), brook trout, and sculpin. Cutthroat trout dominate, averaging 400 native fish per mile; brook trout, averaging 60 per mile, are scattered throughout the stream but are most numerous in the headwaters. The creek supports spawning runs of cutthroat trout from the Blackfoot River and Reservoir and, together with its tributary Spring Creek, is probably the most important cutthroat spawning tributary in the entire system.

Diamond Creek appears to have become degraded in recent years, probably owing to livestock influences, changes within beaver impoundments, and modifications by beaver impoundments. Despite degraded habitat, the stream has excellent potential to rebound to its former high levels of fish production.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

From June 21 to September 15, 200 cattle are permitted to use an allotment in the national-forest lands that include the Diamond Creek area. Approximately 550 AUM's (animal unit months) of feed, valued in 1974 at about $3,200, are consumed annually. The proposed mine area is grazed as part of this allotment in conjunction with other private and leased land and constitutes a significant portion of the total operation.

2. SOCIOECONOMIC DEVELOPMENT

Present development near the minesite consists of one range operation and several cabins that are used seasonally. There are no dwellings on the site.

3. TRANSPORTATION AND UTILITIES SYSTEMS

There are no transportation or utility systems on the minesite, except for low-standard utility roads developed for mining and range management; these roads receive no programmed maintenance and are negotiable only by offroad vehicles. However, the site is near moderate-standard travel routes and is accessible by the secondary route along Diamond Creek.

4. RECREATION RESOURCES

The site is suitable for year-round recreation uses but receives most passive-recreation visitors in the fall. It is not well suited to destination-type development but is used as a base-camp area for activities at higher altitudes or on adjacent undeveloped land, or as a through-travel corridor. No facilities have been developed primarily for recreation, so existing uses involve mainly the natural terrain or the utility roads.

Driving for pleasure is the most important recreation use on Diamond Creek road. During the winter, when roads are not plowed, snowmobilers are increasingly using the heavy snow cover and open flatlands in Upper Valley near the minesite. Deer and elk hunters are the most common visitors. Fishing for trout and whitefish is good in Diamond Creek and many of its tributaries, such as Cabin and Timothy Creeks. Other activities include hiking, horseback riding, cycling, and collecting forest products, such as firewood, from the abundant and accessible dead and dying timber. The U. S. Forest Service maintains a minimum level developed camp, several hunter camps and a through route to Georgetown Canyon.

5. ARCHEOLOGIC AND HISTORIC VALUES

A cultural inventory of the site was made in 1975 by Professor B. Robert Butler, an archeologist at Idaho State University. No artifacts were recovered nor was there any evidence of prehistoric cultures. No historic sites are recognized on the leaseholds or fringe acreage.

6. AESTHETICS

Although the variety class for the Diamond Creek area is rated moderate, there is considerable local interest in its aesthetic quality. A public-opinion sampling conducted by the Forest Service indicates that most users of the area are interested in its visual quality and want that quality preserved. It is accessible by secondary and utility roads, and most of the proposed mine area is within one-half mile of existing roads. Roads penetrate much of the area, but impacts are largely confined to the road corridor. The basic landscape still exists with a few subordinate modifications. Aesthetic values are influenced by the undeveloped character of the area.

CHAPTER III
ENVIRONMENTAL IMPACTS

The impacts described in this chapter are based upon mining at a rate of 2.5 million tons per year. At a lower, more probable level of mining assumed by the Task Force, as shown in table 1-1a, 34 million tons will be mined by the year 2000. The significant changes in impacts will be a reduction of about 50 percent in sediment production. Other impacts would remain about the same.

A. NATURAL ENVIRONMENT

1. LAND RESOURCES

a. Land Surface

Mining will create 400 acres of pits and 164 acres of dumps. Associated surface facilities will modify 100 acres. About 259 million cubic yards of waste will be moved by the year 2000.

The pit will be 12,000 feet long, an average of 1,400 feet wide, and up to 750 feet deep. Proposed backfilling of all mined panels except the last will reduce the length of the highwall to about 1,000 feet. The pit from the last panel will be made into a lake of about 30 acres. Dumps will be smoothed and will have a low profile.

The proposed beneficiation plant on private land near the minesite will modify as much as 952 acres, of which 840 acres will be in ponds if a wet process is used; 112 acres will be modified if a dry process is used.

b. Geology and Mineral Resources

Mining will remove 57.5 million short tons of phosphate rock by the year 2000 which will include 1.4 million short tons of fluorine, 46,000 short tons of vanadium, 6,300 short tons of uranium, and 58,000 short tons of rare earths. Only the phosphate will be recovered.

c. Soil

Mining will disturb soils on 664 acres, at a rate of about 100 acres per year for the first 5 years of mining, and at a rate of 11 acres per year for the remaining 16 years. The proposed beneficiating plant will disturb soils on 112 acres. If wet processing is used, an additional 840 acres will be disturbed by tailings ponds.

2. WATER RESOURCES

a. Water Supply

1. Surface Water

More than 180 cfs will flow onto the site during an extreme flood; such a flood would require 900 acre-feet of storage to provide a retention time of 60 hours. The French drains have a capacity of 44 acre-feet and thus would be overtaxed. The depths of the two proposed 10-acre sediment ponds are not specified; they would have to be 45 feet deep to accommodate 900 acre-feet. If the French drains and the sediment ponds are overtaxed, sedimentation will occur downstream from the site. On the basis of maximum recorded flows in nearby streams, floodflows in Diamond Creek near the mine could be as large as 900 cfs during exteme floods. Proposed mining at IMC's Husky No. 1 mine at the head of Stewart Canyon could intensify these effects. The volume of water from the drainage area on the ridge above the mined area is estimated to be more than 2,000 acre-feet annually; changes in the pattern of snow accumulation as a result of mining would alter this amount.

Reclamation will create Diamond Lake in the final southeast panel of the pit. The lake will have a surface area of about 30 acres and will be permanent.

2. Ground Water

Pumping ground water to dewater the pit at this proposed site will lower the local water table and may diminish the flow of springs and discharge of streams near the pit. The impacts on Diamond Creek as a result of the dewatering process cannot be determined from available data.

If ground water near the pit moves southwestward after reclamation, the backfill will create a permanent barrier as much as 750 feet deep, and ground water may emerge on the east side of the pit to create a boggy area.

If wet processing is used, the proposed calcining plant near the site, based on water use at similar existing plants will consume about 1,000 gpm (1,600 acre-feet per year) of water, part of which will probably be recycled.

b. Water Quality

Sediment will probably increase in Diamond Creek and its tributaries, and the proposed beneficiation plant may also degrade water quality. The Diamond Creek mine will contribute sediment to Diamond Creek from Cabin Creek to Lanes Creek and to the Blackfoot River from Lanes Creek to the lower boundary of the National Forest. Sediment from this mine is estimated by the Forest Service to increase the sediment load of this reach of Diamond Creek to 1½ to 2¼ times the existing load. This rate of sediment yield is low to moderate. No significant increases in water yield are predicted. The estimated increases in sediment are likely to cover the stream bed with silt. The Forest Service also estimates that sediment load in the Blackfoot River would increase from 1¼ to 1½ times the existing loads, with negligible increases in water yield. This rate of sediment yield is low. The effect of the increases on aquatic habitat are discussed in the section on fisheries.

Impacts of existing benefication plants are discussed in Part 1.

3. AIR RESOURCE

The proposed mining will have little effect on the air quality. Particulates, estimated at 0.5 lbs/ton, will have local impact. The proposed beneficiating plant will cause some reduction in quality, mainly from emissions of particulates.

According to data supplied by Alumet, the proposed beneficiating plant will emit the following (pounds per day, by source):

Particulate emissions:

storage area	9.2
rotary drier	115.
transfer and storage	28.8
beneficiation	31.7
coal storage, etc.	16.6
calcining	42.2
production storage	31.7
shipping	28.8
Total	304.0

SO_2 emissions:

coal burning	8.9
rock processing	21.6
Total	30.5

These emissions are within current (January, 1976) standards set by the State of Idaho under regulations G and H for particulate and regulations H and I for SO_2 emissions.

Because the calcining will be done at 1,400° to 1,450° F, there will be little, if any, fluorine emissions.

4. VEGETATION

Vegetation will be progressively removed from 664 acres, including 45 acres of conifer timber. Of this acreage, 530 acres are sagebrush-grass, 110 acres conifer-aspen, and 25 acres mountain brush.

Change in soil moisture from dewatering the pit will cause changes in the composition of the remaining vegetation.

The proposed beneficiating plant will remove vegetation on 952 additional acres, if a wet process is used, or on 112 acres if a dry process is used. If the plant is located in the valley bottom, forage losses will probably be greater than those at the minesite.

5. WILDLIFE

Impacts on wildlife are described in detail in Part 1. At the Diamond Creek minesite, they will be very high.

Deer, elk, and moose will be significantly affected in the Diamond Creek area. As many as 100 deer, 50 elk, and 10 to 15 moose may be lost. Most of a primary elk calving ground will be lost. The effect of increased competition for available space resulting from loss of as many as 50 elk will have an impact on the overall populations in the area.

A significant habitat for forest grouse will be altered.

The disturbance of beaver ponds and the removal of riparian vegetation, especially willow, in Yellowjacket Creek, will force beaver and moose into the upper reaches of the Diamond Creek drainage and will displace waterfowl. It is estimated that about 10 beavers, 6 pair of Canada geese, and 8 greater sandhill cranes will be lost as well as an unquantified number of other ducks and geese. The creation of Diamond Lake offers a potential for waterfowl habitat, although this cannot be determined until termination of mining and reclamation, well after the year 2000.

Impacts on raptors and small mammals will be high.

6. FISHERIES

Pumping to dewater the pit could cause ephemeral conditions in Diamond Creek. Any lowering of water quality also will degrade fisheries; any changes in sediment or streamflow will reduce fish populations in Diamond Creek. Impacts would likely be moderate. Diamond Lake could offer potential for new fisheries.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Forage will be progressively removed from 664 acres of rangeland with an estimated average annual production of about 500 pounds of usable forage per acre, air dry weight. During most of the life of the mine, about 330 AUM's, valued at $1,950 annually, will be lost on the site; some additional forage may be lost on adjacent lands.

2. SOCIOECONOMIC DEVELOPMENT

The proposed mine will employ 160 people when in full operation. The social and economic impacts of this proposal in itself is not significant. However, the cumulative effects of this and other proposed mines on the region are significant; they are described in Part 1.

3. TRANSPORTATION AND UTILITIES SYSTEMS

Impacts of the transportation and utility systems are discussed in Part 3.

4. RECREATION RESOURCE

Because the road in Diamond Creek will receive increased industrial traffic accessibility for recreation uses will be reduced unless separate haul roads are developed which, in turn, will reduce the visual quality of the corridor. However, mine and plant employees will probably engage in hunting and fishing as well as passive activities during leisure hours, thereby adding to recreational use. The existing semi-primitive setting will be lost, eliminating most of the present attraction and recreation uses.

Upgrading of existing roads will ultimately increase accessibility to the area and result in a change to moderate- to low-quality natural conditions. Other recreation activities dependent upon road development will probably increase, including vehicle camping, picnicking, pleasure and offroad-vehicle driving, snowmobiling, and casual hiking; some organizational and commercial development is likely.

5. ARCHEOLOGIC AND HISTORIC VALUES

No impacts can be identified at this time, inasmuch as an inventory revealed no archeologic sites on the minesite.

6. AESTHETICS

Mining will be in the foreground or immediate middleground when viewed by visitors to the area traveling on existing routes, as compared with the present natural vista.

A potential beneficial impact is the proposed creation of a lake after mining has been completed.

The proposed beneficiating plant will impose a visual impact upon the aesthetic appeal of the area. The discordant contrast between the plant and settling ponds and the relative seclusion of the surrounding area will be severe. The plant may further degrade aesthetics by degrading air quality beyond the immediate plantsite.

CHAPTER IV
MITIGATING MEASURES

This Chapter discusses general mitigating measures that apply to both the Diamond Creek and the Swan Lake Gulch proposals; in addition, it discusses measures that apply specifically to Diamond Creek.

State and Federal laws, regulations, and administrative policies that require mitigation or reclamation of mining impacts, and requirements of the surface management agencies and the USGS are discussed in detail in Part 1 Chapter IV. These shall be required at both minesites. Additional mitigating measures as discussed in Part 1, Chapter IV, shall also be considered as appropriate.

The following proposals for mitigation of impacts are taken directly from Alumet's mining plans for the two minesites.

> "At the completion of mining activities, the reclamation program will stress the return to pre-mining use. A timetable for reclamation is given... All surface structures and facilities will be removed, underground pipelines will be sealed, drill holes plugged, and excavations backfilled and graded. Roads will be reclaimed in the manner designated. Topsoil from the pits will be drifted over the overburden and pit areas."
>
> "Revegetation programs will be aimed at leaving the reclaimed mine area in a condition which is in harmony with the pre-mining usage. Revegetation will include:
>
> a. surface preparation
> b. fertilizer and soil applications
> c. initial planting or seeding
> d. replanting or interplanting
> e. continued vegetation management to the point of establishment
>
> "When disturbed areas have been reclaimed, various physical treatments will prepare the revegetation bed and establish improved microclimatic conditions. Cultivation will be required in most cases. Mulch materials, as natural or synthetic fiber or crushed rock, may be added on critical slopes or sites of extreme exposure. In addition, chemical or petro-chemical surface treatments may be required to enhance the probability of germination and establishment of vegetation on certain sites.
>
> "Fertilizers and soil amendments may be added. Applications of lime and/or organic material to certain soils may be necessary. Soil of low potential biotic productivity may be innoculated with microbial cultures whose specifications will be based on soil tests conducted at the time revegetation occurs.
>
> "The species composition, planting rates, and types of planting will be based on the requirements of the government agency having jurisdiction. Forest Service studies indicate that the following species have been most successful;

Native grasses:
- mountain brome
- bluebunch wheatgrass

Exotic grasses:
- slender wheatgrass
- intermediate wheatgrass

Woody plants:
- quaking aspen
- roses
- chokecherry
- snowberry

"In addition, certain legumes may be seeded where soil nitrogen balance must be enhanced.

"Revegetation stock may include seeds, seedlings, sprigs, sod, or transplants, where necessary. During the initial planting or seeding, provision will be included to protect the plants from animal depredations, where necessary.

"As initial revegetation plots become established, or where a less desirable species mixture was required for early stabilization, replanting or interplanting may be necessary to increase population or community densities or modify community composition.

"The key to stabilization and restoration to a setting which is in harmony with the normal landscape is continued vegetation and habitat management. This will be provided until restored sites are established and stabilized."

Alumet proposes to backfill all pits except the last panel of the Diamond Creek pit, where they will create a lake. They will contour remaining dumps to blend with the natural topography, stockpile topsoil for later replacement on disturbed areas, use equipment such as scrapers to minimize soil mixing, and rip and cultivate the surface and restrict off-road vehicle use to minimize soil compaction. They plan to surface or water all roads to reduce dust and erosion.

Alumet proposes to control soil erosion and stream siltation during construction and to stabilize disturbed areas by mechanical, chemical, or vegetative measures. Roads and railroad spurs will be equipped with drainage culverts, water-diversion devices, and appropriate grades to control waterflow. Appropriate buffer and filtration strips will be provided between the construction areas and disturbed surfaces and the perennial streams. Potential surface-water and groundwater pollution will be controlled by soil stabilization, water-diversion and water-control devices, and dikes. All construction will be closely supervised. Erosion and siltation controls will be designed to comply with EPA, NPDES guidelines, and Idaho water quality standards. Disposal areas for nonhazardous solid and liquid wastes will be on sites that will not damage the environment. Fuel-oil and gasoline tanks will be set in diked basins lined with an impermeable membrane or coating to prevent leakage into aquifers. Service and haul roads, borrow sites, campsites, and equipment storage areas will be cleaned up, scarified, revegetated, and rehabilitated to near-natural condition. Alumet plans to make roads, employees, and equipment available to the Forest Service to detect and control fires, and to install fencing to protect wildlife and cattle during mining.

However, available hydrologic data are insufficient to insure that company-proposed erosion and siltation controls are adequate; additional hydrologic data are needed for possible modification of the water-control measures.

Further site-specific mitigating measures that should be required at both sites include the following: (1) Exploratory holes and holes drilled for dewatering pits should be sealed immediately after use to prevent the vertical movement of water, and (2) all utility corridors, railroad tracks, access facilities, and roads that are not in harmony with the environment should be removed and those disturbed areas rehabilitated when they are no longer required for on-going operations, and in no event beyond conclusion of mining operations.

Alumet has proposed the following specific measures for the Diamond Creek site.

Alumet proposes to backfill all but the last panel of the pit, where they will create a permanent lake. Check dams will be built across four separate channels. Intercept dikes with "intermittent catch ponds" will be installed. Water impounded from perennial streams will be replaced immediately below the mine area. Water-control devices will be provided to accommodate an estimated maximum runoff of 542 cubic feet per minute (9.0 cfs) channeled onto the minesite from four separate drainages and a maximum inflow of 1,670 gallons per minute (3.7 cfs) into each 1,000-foot panel. French drains will be constructed in the backfills to permit surface water to recharge the ground-water system; the total volume of the French drains will be 1,900,000 cubic feet (44 acre-feet), designed for a 20-year storm.

At the Diamond Creek minesite, Alumet plans to impound all water pumped from the pits long enough to settle out particulate matter before decanting the water into streams. This will minimize sealing of permeable reaches of the streams with silt. The company plans to monitor water quality before the water is released into streams or, as an alternative, injected into the ground; it also plans to monitor local ground-water fluctuations related to mining.

Alumet expects leachates from the Diamond Creek project area but feels that "the distance between the project area and Diamond Creek should provide a natural mitigative measure." The environmental assessment states,

> "Ground water hydrologic impacts will be mitigated through the use of a ground water management program which will be mutually compatible with the engineering design and environmental protection

goals of the proposed action. The techniques designed to minimize environmental impacts on ground water are related to the well point system to be used to dewater the mining panels. The dewatering system... should maintain a relatively stable, dry condition for mining and provide an adequate method to minimize ground water contamination. The dewatering technique will minimize potential infiltration of leachates and petroleum residues, restrict ground water bacteriological contamination, and provide a temporary siltation basin in case of flooding."

The mining plan states;

"In the Diamond Creek area, revegetation programs may be oriented toward grasses and aspen to provide improved elk habitat on public lands, but may establish more grasses on private lands where landowners prefer domestic stock range.

In general, these proposed measures conform to those required by the land-management agencies and the USGS District Mining Supervisor. Additional site-specific mitigating measures that Federal agencies could require at the Diamond Creek site to further reduce further impacts include the following:

(1) An alternative site for the waste dump should be selected to avoid placing it on existing stream channels where recharge to, or discharge from, the ground-water system occurs; (2) all ponds associated with the plant should be sealed to prevent infiltration of pond water into the ground-water system, and (3) additional hydrologic data should be obtained to verify the adequacy of the water-control measures as designed. If inadequate, they should be redesigned on the basis of the data obtained.

CHAPTER V
ADVERSE EFFECTS THAT CANNOT BE AVOIDED

Figure 4-5 shows disturbance of the land surface during mining and reclamation for both levels of mining. The entire disturbed area will be reclaimed.

Soils will be disturbed on 664 acres over the life of the operation. A beneficiation plant will occupy 112 acres, and tailings ponds will occupy 840 acres if a wet process is used. Of this 840 acres, 40 acres or less will be disturbed at any one time. Neither the plant nor the pond will be on the Federal leaseholds or fringe acreages.

During mining, the ground-water gradient west of the pit will be reversed, reducing discharge into Diamond Creek. Subsequent backfilling will similarly reduce groundwater discharge by creating a barrier to ground-water flow toward Diamond Creek. About 1,000 gpm of water will be consumptively used for ore processing if the wet process is used. Sediment loads will be increased both during and after mining. If all mitigating measures as proposed are successful, the resulting sediment yield will be low. However, experience has shown that failures do occur; under these conditions, sediment yields will be low to moderate. Should surface-water control devices and French drains fail to accommodate runoff, increased erosion, sedimentation, and degraded water quality cannot be avoided. Capacities as designed are likely to be exceeded.

Revised mining and plant site plans indicate a berm and ditch system to collect runoff and route water to settling ponds on the east side of Diamond Creek. The effects on runoff, sediment loads, and water temperatures will depend on the design of the settling ponds. If retention times are long, the suspended sediment load will be low but discharge will decrease and temperatures increase. If retention times are short, discharge and water temperatures will be little affected but suspended sediment loads will increase.

Emissions from the calcining plant will lower air quality, although they will be within present State air-quality standards. Particulate matter will amount to 304 pounds per day and SO_2 emissions to 30.5 pounds per day. Lowering of water quality as a result of calcining will be low, but of long duration in the vicinity of the tailings ponds.

Vegetation will ultimately be removed from 664 acres, with about 80 to 450 acres cleared at any one time during the life of the mine. Annual forage production on about 635 acres of reclaimed land will probably not exceed 300 to 1,200 pounds per acre, air dry weight--about half the present value. Production on Diamond Lake (about 30 acres) will be lost. Processing facilities near the mine will remove vegetation on either 112 or 952 acres.

As many as 100 deer, 50 elk, and 10 to 15 moose will be lost, and a significant breeding, nesting, and brood-rearing habitat for forest grouse will be altered. About 10 beavers will be lost from

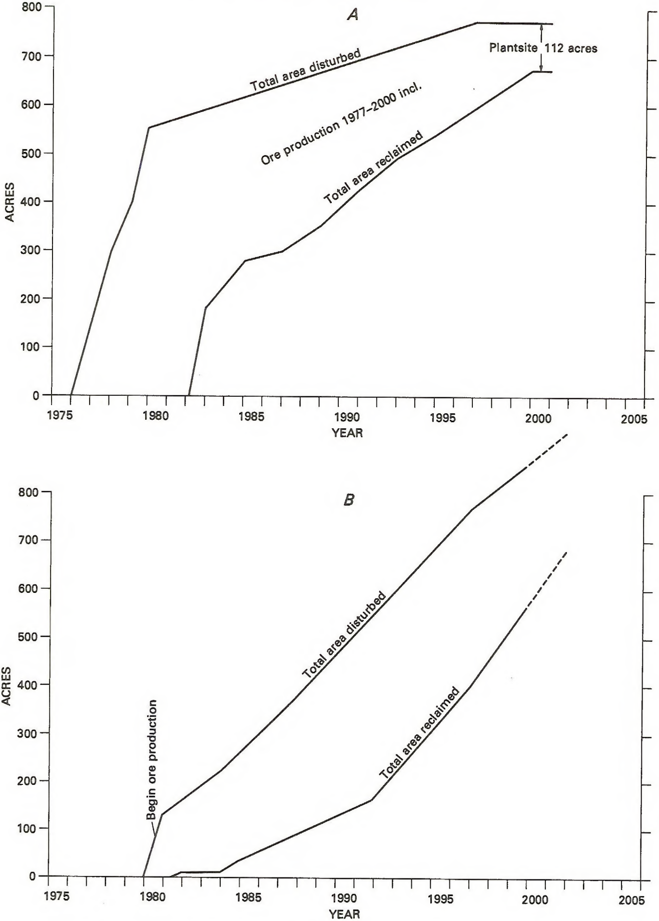

Figure 4-5.—Land disturbance and reclamation, Diamond Creek mine. *A*, Based on mining plan as submitted for approval. *B*, Based on revised level of mining.

Diamond and Yellowjacket Creeks, and about 6 nesting pairs of Canada geese will be lost Sandhill crane habitat will be disturbed and about 8 cranes lost; this habitat is also suitable for whooping cranes. Numerous ducks and geese also will be displaced. Fisheries will be reduced or eliminated, depending upon success of mitigating measures.

Increased sediment, reduced water quality, and fluctuating stream flows will reduce fish populations in the immediate area and downstream.

Forage will ultimately be removed from 664 acres of rangeland. Average annual production of usable forage on about 635 acres of reclaimed land will probably not exceed 125 pounds per acre, air dry weight. Forage will be eliminated from Diamond Lake (probably about 30 acres) and lost on 112 acres during the life of the beneficiating plant. If wet processing is used, forage will be eliminated in 40-acre increments for a total of 840 acres.

Pleasure driving, snowmobiling, hunting, fishing, and other outdoor forms of recreation will all be adversely affected and curtailed to differing degrees.

No known archeologic sites will be destroyed.

The proposed mine and calcining plant will alter the present pastoral character of the area. Both will have strong aesthetic impacts, because they will be highly visible. Similarly, productivity will be reduced on either 112 or 952 acres for the nearby calcining plant and attendant settling ponds, depending on the process used. Some long-term reduction in game herds--especially deer, elk, and moose--will result from competition on nearby ranges from the displaced animals. The present pastoral character of the area and its aesthetic resources will not be fully renewable after mining.

CHAPTER VI
SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

Based upon mining as originally proposed, from 1977 to 2000, about 58 million short tons of phosphate rock will be removed from Diamond Creek for calcining nearby and processing into fertilizer at a proposed plant in Utah. The mining will disturb soils on 664 acres and move 250 million cubic yards of waste rock. The beneficiating plant near the minesite will remove vegetation and disturb soils on either 112 or 952 acres, depending upon type of processing.

During mining, about 1,670 gpm (2,670 acre-feet per year) of ground water will be pumped, diminishing the flow of springs just above the pit and of streams east of the pit. About 1,000 gpm (1,600 acre-feet per year) of water will be required for the beneficiating plant nearby. Water quality in Diamond Creek will be lowered during mining; reduction of the quality of ground water could result from seepage from the ponds associated with the beneficiation plant. There will be a short-term lowering of air quality from mining and processing, within present air quality standards.

During mining, vegetation will be progressively removed from 664 acres; forage production of 600 to 2,300 pounds per acre, air dry weight, will be lost on about 80 to 450 acres at any given time. The beneficiation plant will remove vegetation from 112 acres, and tailings ponds may occupy 840 acres. As many as 100 deer, 50 elk, and 15 moose will be displaced to adjacent range, which is now at or near carrying capacity. Diamond Creek near the mine will experience short-term change, with likely moderate reductions of fish populations possibly extending to the Blackfoot Reservoir. On the minesite, about 250 AUM's of forage, valued at $1,950 annually, will be lost during mining, because most of the site will not be available for grazing. The aesthetic appeal and the recreation resources will be lowered during mining. The proposed plant and settling ponds will conflict with the natural undeveloped character and contrast with the natural visual characteristics of the area.

Annual forage production on about 635 acres of reclaimed land will probably not exceed 300 to 1,200 pounds per acre, air dry weight--about half the present value. Production on Diamond Lake (about 30 acres) will be lost. Similarly, productivity will be reduced on either 112 or 952 acres for the nearby calcining plant and attendant settling ponds, depending upon type of process used. Some long-term unquantifiable reduction in game herds--especially deer, elk, and moose--will result from competition on nearby ranges from the displaced animals. Production on Diamond Lake (about 30 acres) will be zero. On the entire site, average production of usable forage of about 175 AUM's, valued at $1,030, will be lost annually. Improved access will reduce the present forms of recreation associated with the natural, undeveloped environment. The present undeveloped character of the area and its aesthetic resources will not be fully renewable after mining.

CHAPTER VII
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Based upon mining as originally proposed from 1977 to 2000, Alumet will mine about 58 million tons of phosphate rock on the Diamond Creek site. This ore contains 1.4 million short tons of fluorine, 6,300 short tons of uranium, 46,000 short tons of vanadium, and 58,000 short tons of rare earths, which will be removed. The company plans to recover the contained fluorine and uranium as byproducts of its Utah processing operation. The contained vanadium and rare earths will not be recovered initially, but will be stockpiled for possible future processing when and if economics and technology permit their recovery on a profitable basis. Soils will be disturbed on 664 acres, and vegetation productivity will be reduced. Wildlife that cannot successfully relocate will be lost with consequent loss of hunting opportunity. The undeveloped character of the areas will be altered by mining-related changes.

The mining and reclamation of disturbed areas will require about 43 million gallons of diesel fuel and 2.3 million gallons of gasoline, as well as unknown amounts of lubricants and explosives. An unknown amount of cement, aggregate, structural steel, piping, and electrical components will be used in mining, milling, and calcining facilities.

Transportation of ore to the proposed beneficiating plant will require an unknown but minor commitment of fuel and materials.

About 450 million kilowatt hours of electricity, 230,000 gallons of gasoline, and 170,000 tons of coal will be consumed in beneficiating the ore. About 1,600 acre-feet of water per year will be consumed for ore processing, if a wet process is used.

After beneficiation and calcining, about 40 million tons of processed phosphate rock will be transported by rail to the proposed fertilizer manufacturing plant in Utah. About 26 million gallons of diesel fuel will be required to move the rock from the region. In Utah, about 5 billion kilowatt hours of electricity, 230,000 gallons of gasoline, and 52 million tons of sulfuric acid will be used to manufacture P_2O_5 for fertilizer.

At the lesser level of mining, as shown in table 1-1a, 34 million tons will be mined by the year 2000, with a proportional reduction in the commitment of other resources.

CHAPTER VIII
ALTERNATIVES

This chapter discusses alternatives to both the Diamond Creek and Swan Lake Gulch proposals; in addition it discusses alternatives specifically, to the Diamond Creek proposal.

The general administrative options available to the Secretary of the Interior are discussed in Part 1.

If both mine plans are rejected, Alumet will probably mine on their patented Lanes Creek property, causing impacts similar to those noted for Diamond Creek.

The following are alternatives to the Diamond Creek mine plan. The proposed lake could be made smaller or eliminated by more backfilling of the pits. Dumps would still remain, but they would be roughly 10 to 20 percent smaller than the proposed dumps. The environment without the lake would be more like the original environment, but the lake might have desirable fisheries, recreation, and aesthetic impacts.

The alternative of repositioning dump locations to avoid stream channels would reduce impacts to streams and fisheries.

Alumet proposes to haul ore from the pit to the railroad or calcining plant by scrapers, or, alternatively, by conveyor. Impacts of the two systems would probably be similar, inasmuch as each would require a corridor which would disturb soil and remove vegetation.

The alternative proposal to inject the mine drainage into the ground rather than releasing it to the streams would reduce the impacts upon Diamond Creek, but could cause local mounding of the groundwater table, which may in turn further aggravate the mine drainage problem.

PART 4.2
SWAN LAKE GULCH MINING PLAN

CHAPTER I
DESCRIPTION OF PROPOSED ACTION

The proposed project is in the Aspen Range about 9 miles east-southeast of Soda Springs. The project involves Federal phosphate leases I-014958 (400 acres) and I-016179 (40 acres), plus adjacent fringe-acreage applications (880 acres), all in the Caribou National Forest (fig. 4-6).

The mine plan states drill and trench data are sparse and using an assumed 59-foot thickness of ore the mining plan, as submitted, must be considered conceptual. Alumet conducted an approved exploratory drilling program on the lease during September 1975. Analysis of the exploration indicates the east pit will not extend northerly beyond the lease boundary as shown in Figure 4-8. This would be a significant change in the mining plan.

The current mining plan does not contain sufficient engineering details for final consideration of approval or disapproval under Federal Regulations 30 CFR 231. The following details are lacking at this time and clarification will be required for final consideration:

1. Mode of ore transportation to the rail head is indefinite with a choice between surface conveyor or underground conveyor. If underground method is used disposal of waste rock from tunnel or tunnels is not shown.

2. Utility and mine access road rights of way is indefinite.

3. Though the plan speaks of an on-going program of air and ground water monitoring to assure the maintenance of environmental quality, details are lacking as to how and where the monitoring will be conducted and to whom the results will be reported.

4. Mine facilities for staff, workers, and for machinery maintenance and repair are not indicated.

5. The plan proposes activities on fringe acreage on which the Company has not yet obtained a lease.

A. PROPOSED MINING OPERATIONS

The following information is from the mining plan submitted to the Conservation Division, U.S. Geological Survey, Pocatello, Idaho, on December 27, 1974; from the environmental assessment, prepared by VTN Corporation; and from interviews with Alumet personnel.

The mining plan indicates no past mining. An interview disclosed that only minor exploration drilling has been done on the property.

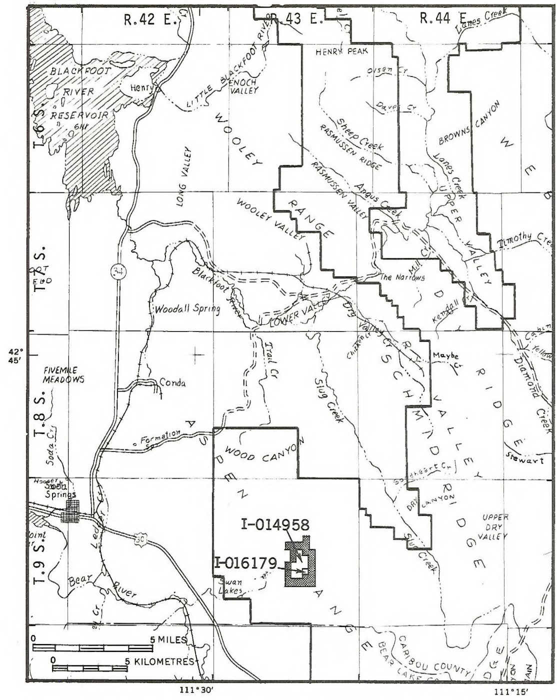

Figure 4-6.--Location of Federal phosphate leases and pending fringe acreages (patterned) for the proposed Swan Lake Gulch mine.

Ore will be mined in two open pits, termed "east" and "west" (fig. 4-7). Pit slopes are designed at 45^o; pit depths, 500 to 600 feet. Topsoil disturbed by mining will be stockpiled for use in reclamation.

Soil and waste rock will be stripped throughout the year, although the phosphate rock may be mined on either a 6-month or year-round basis. All mining will be done with rubber-tired scrapers assissted by bulldozers. Waste from the initial cut will be placed in a waste dump northwest of the east pit (fig. 4-8). Material excavated from the active pit will be placed in the previous excavation. The initial stripping ratio will be 10:1 (cubic yards overburden: cubic yards ore). The average ratio during the mine life would be 7.4:1.

B. RECLAMATION

All surface structures and facilities will be removed; underground pipelines, sealed; drill holes, plugged; and disturbed areas, reclaimed when the mine is closed.

The pits will be backfilled. The dump and spoil-filled pits will be shaped to blend with the contours of the undistrubed area and then covered with stockpiled topsoil and intermediate shale. Revegetation with a variety of native grasses, forbs, and shrubs will include surface preparation, fertilizer and soil applications, planting or replanting, and management until vegetation is established. Reclamation is scheduled to begin within 2 years of the start of operations and to continue throughout mining. The final cut of the west pit will be backfilled with rehandled waste from the initial cut in the east pit.

The mine plan provides for drainage ditches to protect waste dumps and pits from surface water. Such water will be diverted to four settling ponds, and the overflow water will be channeled to natural drainage.

C. SURFACE FACILITIES

Access to the Swan Lake Gulch project area is by existing roads in Sulphur Canyon and Swan Lake Gulch. Both roads will require improvement for heavy haulage. An alternate road along a jeep trail in Dry Canyon would be 1 mile longer than the Swan Lake Gulch route. Road rights-of-way will be fenced as necessary.

Transportation of ore from the mine to the existing railroad system in Bear River valley will be by an overland ore conveyor. The system includes an ore crusher at the end of the conveyor feed, an elevated or tunneled crossing of U.S. Highway 30N, and stockpile and railroad load-out facilities. The conveyor route is about 5 miles long and has an 1,800-foot vertical drop. The route will mainly parallel the proposed access road in Swan Lake Gulch. A high-voltage electrical feeder line will be extended along the access road from the existing high-voltage line in Bear River Valley (map 13).

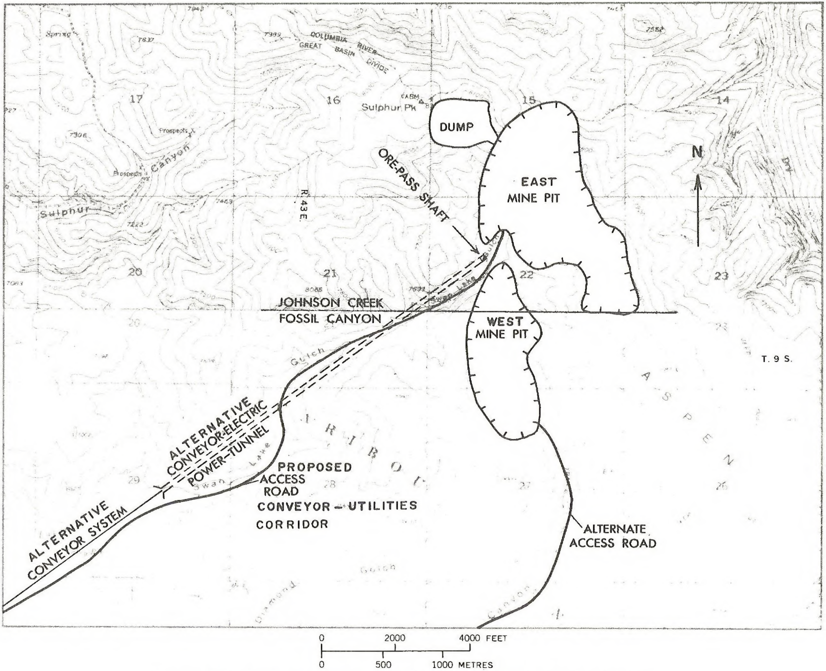

Figure 4-7.--Mining plan proposed for the Swan Lake Gulch site.

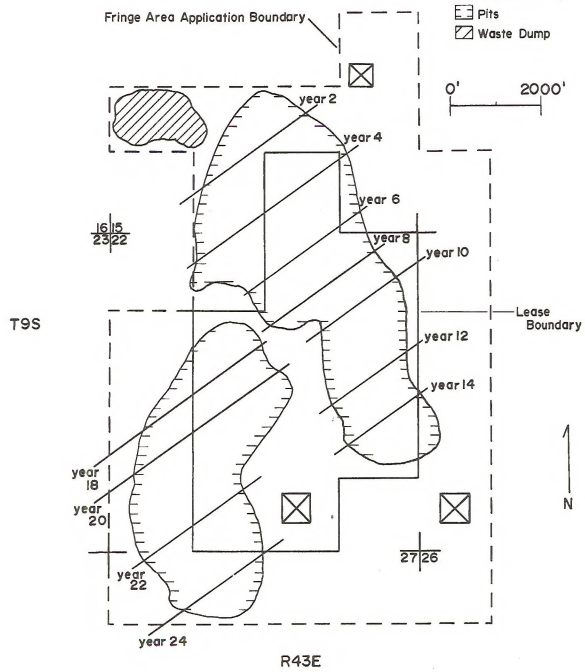

Figure 4-8.--Mining sequence proposed for the Swan Lake Gulch mine.

On site employee housing is not planned. Locations of shop, administrative, garage, and worker-change spaces are not specified.

In interviews, Alumet has indicated a possible alternative method of moving ore from the mine to railway facilities in Bear River valley. A tunnel would be driven northeastward from the approximate center of sec. 29, T.9 S., R. 43 E. For about 11,000 feet at a grade of about 5 percent. From the end of this tunnel a vertical raise or shaft would open to the surface at a point in sec. 22, T. 9 S., R. 43 E., close to the two mine pits. A belt conveyor in the tunnel would extend from the tunnel portal southwestward for about 15,500 feet to a railroad-loading facility in the northeast corner of sec. 2, T. 10 S., R. 42 E. This conveyor would cross U.S. Highway 30N with either an underpass or overpass. A railroad siding would be built parallel to the main line of the Union Pacific Railroad to serve the load-out facility. Ore would be dropped from the mine down the shaft, from which it would be fed onto the conveyor and moved to the railroad facility. Electric power would be carried the length of the tunnel and through a special borehole to the surface at the mine to serve the mine office and shop.

CHAPTER II
DESCRIPTION OF THE EXISTING ENVIRONMENT

A. NATURAL ENVIRONMENT

1. CLIMATE

The general climate is described in Part 1. The Swan Lake Gulch site is probably 5^{o} to 7^{o} cooler than Conda, ten miles northwest and 1,500 feet lower. The growing season is probably 30 days or less at higher elevations on the site. Precipitation is estimated to be nearly 30 inches annually. Snow depths are greater and snow cover lasts longer than at Conda. Snow accumulated at Slug Creek Divide snow course, about 8 miles southeast of the site at an altitude of 7,225 feet, averaged 16.7 inches of water (about 45 inches of snow) on April 1. Most of the basin faces southwest, and snow melts sooner than on northeast-facing slopes. Patterns of snow drift are unknown.

2. LAND RESOURCES

a. Land Surface

The minesite is high in the Aspen Range, at an elevation of 8,000 feet (fig. 4-7). It is southeast of sulphur Peak and in the upper part of Swan Lake Gulch, which leads southwestward into the broad valley of Bear River. The site has steep slopes except for the part that extends across the flat areas of the Columbia River-Great Basin drainage divide. The relief between Bear River and Sulphur Peak is about 2,450 feet.

b. Geology and Mineral Resources

The minesite is on the south end of the Trail Creek syncline, where small folds and faults have combined to create an irregularly segmented distribution of the Meade Peak Member of the Phosphoria Formation. The segments to be mined appear to be free of major structural complexities.

The Meade Peak is 201 feet thick; on the basis of the meager data available, the lower and upper ore zones total 59 feet. Production of 57 million short tons of ore is planned. Estimates of the total resources of significant elements in the ore are: 1.4 million short tons of fluorine, 6,300 short tons of uranium, 46,000 short tons of vanadium, and 57,000 short tons of rare earths.

c. Soils

The following landtypes occur on the leaseholds and fringe acreages:

Landtype	Area (acres)
52	1,080
52-1	130
53-2	110

Figure 4-9 shows the distribution of landtypes near the minesite, and table 4-2 gives the characteristics of the soil families in each landtype.

Landtype 52 consists of weakly dissected to smooth, mature fluvial slopes of low relief. The topography is gently rolling and the drainage pattern is weakly dendritic. The soils are deep fine-loamy and loamy-skeletal. Soils with depths to bedrock of 4 to 5 feet cover 95 percent of the landtype, and soils with depths 20 inches or less cover 5 percent.

Landtype 52-1 consists of mature, water-carved, generally smooth land. Drainage is not extremely deep. Ridges are generally rounded. Outcrops constitute about 2 percent of the landtype, and depth to bedrock ranges from less than 2 to more than 5 feet. Soils are shallow to deep, loamy-skeletal, mixed (80 percent), and very deep, fine-loamy, mixed (20 percent).

Landtype 53-2 consists of mature, faulted, dissected fluvial slopes. Slope length ranges from 500 to 1,000 feet. Soils are moderately deep to deep, loamy-skeletal and mixed. Depth to bedrock ranges from 2 to 5 feet.

3. WATER RESOURCES

a. Water Supply

1. Surface Water

The minesite straddles Swan Lake Gulch for nearly 0.6 mile. Drainage area of the gulch at the lower end of the proposed pit is about 0.8 square mile, most of which is exposed to the southwest. About 0.1 square mile faces northeast and drains into Slug Creek. Annual precipitation, if evenly distributed, would yield about 13 inches of runoff, but drifting of snow probably causes nonuniform runoff, and drifting patterns are not known. Flow in Swan Lake Gulch is intermittent, and in the lower reaches the stream seldom flows. Significant surface flows were observed in Swan Lake Gulch at the minesite on June 5, 1975, but surface flows into Swan Lakes at that time were from underground sources which surfaced short distances above the lake. There were no surface channels and no other evidence of surface flows from the lowest lake.

2. Ground Water

The site is in the headwaters of Swan Lake Gulch, where a small spring feeds a perennial reach. The water from the spring, which issues from the Phosphoria Formation, runs about one-fourth mile downstream and disappears into the ground near a fault at the contact of the Wells and Phosphoria Formations. The recharge area and the path by which the water arrives at the spring is not known.

Exploratory boreholes at the site are reported to be dry, although the spring is evidence that at least a small quantity of ground water does occur in some places in or near the proposed pit area. The

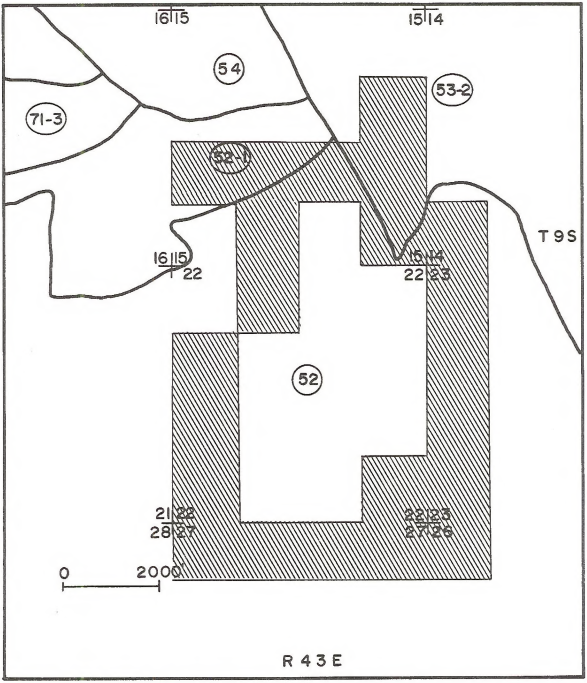

Figure 4-9.--Landtypes near the Swan Lake Gulch site. Patterned area shows fringe acreage.

Table4-2.--Physical characteristics of soils at Swan Lake Gulch minesite. VL = very low, L = low, M = moderate, H = high, VH = very high

Land-type	Soil families	Percent of area	Erosion in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road Construction hazard	Slope range, in percent	Revegetation potential
				Depth in inches	Suitability					
52-1	Argic Pachic Cryoborolls, loamy-skeletal, mixed	50	0.048	10	M	5.7	VL	L	30-40	M
	Pachic Cryoborolls, loamy-skeletal, mixed	20	.013	10	H	4.3	VL	L	25-45	M
	Cryic Pachic Paleoborolls, fine-loamy, mixed	20	.008	10	M	9.2	L	M	30-50	H
	Argic Lithic Cryoborolls, loamy-skeletal, mixed	10	.006	0	L	1.3	VL	VL	10-30	VL
53-2	Argic Pachic Cryoborolls, loamy-skeletal, mixed	45	.014	10	M	5.7	L	L	25-50	M
	Typic Cryoborolls, loamy-skeletal, mixed	20	.019	8	H	4.5	VL	L	30-40	M
	Mollic Cryoboralfs, loamy-skeletal, mixed	35	.007	6	M	8.8	VL	L	30-40	M

Table 4-2.--Physical characteristics of soils at Swan Lake Gulch minesite--Continued

				Topsoil potential						
Land-type	Soil families	Percent of area	Erosion, in inches per year	Depth, in inches	Suitability	Available water capacity	Mass failure hazard	Road Construction hazards	Slope range, in percent	Revegetation potential
52	Typic Cryoborolls, fine-loamy, mixed	44	0.005	10	H	7.0	L	L	0-30	H
	Typic Cryorthents, loamy-skeletal, mixed	25	.007	12	M	5.2	M	L	20-40	M
	Argic Cryoborolls, loamy-skeletal, mixed	25	.045	10	M	4.5	M	L	35-45	M
	Lithic Cryoborolls, loamy-skeletal, mixed	5	.023	6	L	3.4	L	M	40-50	VL

spring water probably has its source in the Rex Chert, which is commonly fractured enough to transmit water. The Dinwoody formation, which is present at the north end of the proposed pit, probably contains water; the Wells and older formations at this site probably contain little, if any, water at the altitude of the proposed pit.

b. Water Quality

Analytical data are available for two springs, apparently within half a mile of the site; in Alumet's environmental assessment there are, however, ambiguities in the way the data are reported. A significant item, is that the water from one spring contains 4.6 picocuries/litre of radium--above the limit of 3 picocuries/litre recommended by U.S. Public Health Service for drinking water. Discharge of the spring at the time of sampling was negligible.

Surface water quality was measured for four streams near the Swan Lake Gulch site between October and December 1975, by Greiner Environmental. Analyses for the parameters listed in Table 4.1a were performed and results fell within the range of values observed in the Diamond Creek watershed. Concentrations of most trace metals were below the detection limits of the techniques employed. Dissolved oxygen was consistently high and oxygen demand was low.

4. AIR RESOURCES

The present air quality near the minesite is good. Traffic creates some dust and emissions.

5. VEGETATION

The Swan Lake Gulch minesite has about 363 acres of conifer-aspen and 77 acres of sagebrush-grass. Forage production ranges from 400 to 1,600 pounds per acre. The timber is uneconomical to cut.

No rare or endangered plants are known on the site.

6. WILDLIFE

Wildlife, especially deer, elk, moose, coyote, golden and bald eagles, ducks, hawks, owls, herons, cranes, and forest grouse are present in significant numbers in and around the project area.

About 600 deer winter between Swan Lake Gulch and Sulphur Canyon on about 350 acres of critical winter range. Forage production of browse plants, which dominate the winter diet of deer, is about 300 pounds per acre air-dry weight.

As many as 10 to 15 elk and probably a couple of moose utilize the area at times. Some blue and ruffed grouse mate, nest, and rear broods on the canyon bottoms and side slopes during the spring and summer.

Nine species of waterfowl including the greater sandhill crane are common in the Swan Lake marsh. Associated with the marsh are muskrat, shorebirds, marsh hawk, marsh wren, and other birds; garter snake, leopard frog, and salamanders also are present in substantial numbers.

Predators are mainly coyote, red fox, bobcat, and occasional mountain lion. Populations are unknown, but small.

According to the Idaho Fish and Game Department, peregrine falcons have been observed on the leasehold as late as 1975, but none on the site. Suitable whooping-crane habitat is present near the Swan Lake marsh.

7. FISHERIES

The Swan Lake drainage contains a small lake (Swan Lake) and a shallow reservoir (Lakey Reservoir). Swan Lake, about three-fourths of an acre, is stocked annually with catchable-size hatchery rainbow trout. The lake waters are used for irrigation, making water levels unstable. The maximum depth is 48 feet. Without continual stocking, the lake would not support a fishery.

Lakey Reservoir is shallow and marshy and has a maximum depth of about 3 feet. The reservoir contains suckers, but salmonids fail to survive the winter. Swan Creek is ephemeral most of the year below the water diversions and does not support a fishery.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

The agriculture nearest to the minesite is primarily dry-land grain crops about 4 miles to the west in the foothills of the Aspen Range, and 4.5 miles to the east in the Slug Creek drainage. Irrigated crops are grown to the north at the mouths of both Sulphur and Middle Sulphur Canyons and near the dry farms to the west.

Two thousand fifty sheep use the national-forest lands on and near the minesite from June 15 to September 15. Forage from these Federal lands amounts annually to approximately 6,150 sheep-months of feed, valued in 1974 at about $9,600. The minesite is part of an allotment used in conjunction with other private and leased land, and constitutes a significant portion of the grazing operation. Sheep are moved onto the national-forest lands in a trailing operation. The minesite is about 4 percent of the total allotment.

2. SOCIOECONOMIC DEVELOPMENT

The minesite is primarily open range.

3. TRANSPORTATION AND UTILITIES SYSTEMS

A primitive access road through the minesite runs from the Sulphur Canyon road to a jeep trail in Dry Canyon. The Sulphur Canyon road leaves U.S. Highway 30 N about 3.5 miles southeast of Soda Springs; it is used mainly by traffic to Simplot's mining operation to the north.

4. RECREATION RESOURCES

The minesite provides good habitat for deer and elk, making hunting popular. Snowmobiling is also popular, as are hiking, horseback riding, and cycling, which originate mainly from the Swan Lake area. Swan Lake provides an attraction for campers, picnickers, and those who enjoy viewing wildlife, birds, and plant life. Collecting firewood and rocks is also increasing in popularity.

No facilities have been developed for recreation; recreation uses conform to access and natural terrain limitations. Access to and within the area is by utility roads. Snowmachines are the only way to reach the site during the winter. The difficult access to the site gives it a remoteness quality.

Visitors to the proposal site are few, and hunters predominate. Most visitors stay less than 2 days, and snow conditions normally restrict recreation uses to late spring, summer, and fall. The site does not lend itself to destination-type development, but it could be utilized as a base-camp area for activities on adjacent lands.

5. ARCHEOLOGIC AND HISTORIC VALUES

A cultural inventory of the minesite was made in 1975 by Professor B. Robert Butler an archeologist at Idaho State University.

The midsection of a black obsidian projectile point was found near a small spring. Professor Butler recommended archeological testing near the spring. The minesite was recommended for archeological clearance. No historic sites are recognized on the minesite.

6. AESTHETICS

The variety class for this area is rated moderate to low. Access to and within the site is available by low-standard utility roads. However, the minesite is in the middleground viewing area of U.S. Highway 30 N, a primary travel route, and the Slug Creek road, a secondary travel route. Its location, near 8,302-foot Sulphur Peak, makes it a vantage point for the surrounding lands. Much of the site is in the Huckleberry Basin Roadless Area, which has a wilderness aesthetic appeal.

CHAPTER III
ENVIRONMENTAL IMPACTS

At either level of mining, the following impacts will not occur until after the year 2000.

A. NATURAL ENVIRONMENT

1. LAND RESOURCES

a. Land Surface

Mining will create 300 acres of pits and 234 acres of dumps, and surface facilities will modify 100 acres on the minesite and 65 acres off the site. The east pit will be about 6,000 feet long, 3,400 feet wide, and about 350 feet deep. The west pit will be about 4,600 feet long, 1,800 feet wide, and 400 feet deep; both pits will be backfilled. Waste rock will total 180 million cubic yards, and the dump will be smoothed and have a low profile.

b. Geology and Mineral Resources

Mining will remove 57 million short tons of phosphate rock, which will include 1.4 million short tons of fluorine, 46,000 short tons of vanadium, 6,300 short tons of uranium, and 57,000 short tons of rare earths. Only the phosphate will be recovered.

c. Soils

Mining will disturb soils on 634 acres on the minesite, at a rate of about 100 acres per year. Road, powerline, and conveyor facilities will disturb 65 acres on the site.

2. WATER RESOURCES

a. Water Supply

1. Surface Water

Until revegetation becomes effective, floods as high as 100 cfs could be expected from the disturbed areas, and the total volume from the disturbed area could average 700 to 900 acre-feet annually, most of it occurring during snowmelt. Such large overland flows will probably carry sediment into Dry Fork of Johnson Creek and thence into Slug Creek. Increased surface flows will extend farther down Swan Lake Gulch than at present. The increased flows will probably continue to be absorbed by the channel before reaching the Swan Lakes, but available data are insufficient to determine whether the Swan Lakes or even Bear River will be adversely affected.

2. Ground Water

The east pit will drain or divert a small spring at the head of the perennial reach of Swan Lake Gulch, and the perennial reach will probably become intermittent. If the spring source lies outside the proposed pit, the water will probably discharge from a new office after the mining stops. If the discharge area is covered with backfill, a boggy area could result. The proposed road and electric-power and conveyor-belt routes in Swan Lake Gulch will diminish recharge to underlying aquifers but probably not significantly; the alternate route in Dry Canyon would not diminish recharge.

b. Water Quality

The Forest Service estimates that mining at the Swan Lake Gulch site will increase sediment loads in Swan Lake Gulch by 7 to 14 times, in Dry Fork of Johnson Creek by 2 to 4 times during mining and 1.5 to 2 times after mining. The increase in sediment load of Johnson Creek from Dry Fork to the national-forest boundary is estimated at about 1.5 times present conditons. The present sediment loads of these streams are very low. The effect of these increases on larger streams are expected to insignificant. High intensity rainstorms move significant amounts of sediment in the ephemeral reach between the recharge zone and upper Swan Lake, but these sediments are generally retained on developing alluvial fans. If sediment loads are increased as estimated, the recharge zones could be sealed so that water and sediment flow downstream to the Swan Lakes each year. However, these recharge zones may be large and permeable enough that the sediment loads would not significantly reduce ground water recharge. If sediments flowing into Lakey Reservoir were increased, the underground outlet could be sealed and a surface discharge system developed.

3. AIR RESOURCES

The proposed mining will have little effect on air quality. Some dust and emissions will result from vehicles. Particulates, estimated at about 0.5 pounds per ton of ore will have local effects.

4. VEGETATION

Mining will progressively remove vegetation from 699 acres--about 523 acres of conifer-aspen (including about 400 acres of timber) and 176 acres of sagebrush-grass.

5. WILDLIFE

Mining will destroy 350 acres of critical deer winter range. As many as 400 to 500 deer may be lost. About 10 to 15 elk and perhaps a moose or two will also be lost. Big-game movement into and across the winter range that remains will be restricted, causing migration route changes.

About 450 acres of habitat for blue and ruffed grouse will be destroyed, resulting in the loss of as many as 200 grouse.

Road building and trucking will disturb waterfowl nesting grounds on about 50 acres of marsh, and will casue the loss of a significant number of shorebirds, marsh hawks, marsh wrens, muskrats, frogs, and snakes. Increased activity in the area will disturb sandhill crane and potential whooping crane habitat.

6. FISHERIES

Sediment washed into Swan Lake or the reservoir, will further lower the limited fisheries. If the mining diverts ground-water from the lake or the reservoir, fisheries will also be adversely affected. The magnitudes of these effects cannot be quantified with available data, but will be minor.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Forage will be progressively removed from 699 acres of rangeland with an estimated average annual production of about 350 pounds of usable forage per acre, air dry weight. During the life of the mine, as many as 1,070 sheep months, valued at $1,700 annually, will be lost on at least part of the site; some additional forage may be lost on adjacent lands.

Livestock water may be diminished or degraded by mining operations.

2. SOCIOECONOMIC DEVELOPMENT

The proposed mine will employ 160 people when in full operation. Social and economic impacts to the site will be minimal and by themselves not significant. The cumulative effects of this and other proposed mines on the region are described in Part 1, Chapter III.

3. TRANSPORTATION AND UTILITIES SYSTEMS

The transportation system proposed for the Swan Lake Gulch mine will greatly improve access to the area. As many as 86 vehicles might commute daily on the access road. Recreational traffic will probably increase because of the improved access. The Sulphur Canyon road will probably be impacted only slightly or not at all.

The 10,000 kw power demand estimated for the proposed conveyor will require increased power line capacity between Soda Springs and Georgetown.

4. RECREATION RESOURCES

Impacts to outdoor recreation are expected to be moderate at the site and high at Swan Lake, but mining will reduce or eliminate existing recreation resources, notably deer and elk hunting, swimming, and camping. Mining will have a high impact on the Huckleberry Basin inventoried roadless area and its associated potential uses.

5. ARCHEOLOGIC AND HISTORIC VALUES

The inventory revealed no archeologic sites on the minesite.

6. AESTHETICS

The mine will have a high aesthetic impact, although the middleground view from U. S. Highway 30 N will be somewhat restricted by the topography. The proposed transportation and utilities systems will have serious aesthetic impacts, especially the conveyor system which will cross U. S. Highway 89. Its location in the foreground viewing zone of this major highway will attract sharp attention to the mining activity and thus magnify the visual conflicts.

CHAPTER IV
MITIGATING MEASURES

General mitigating measures that apply to both the Diamond Creek and the Swan Lake Gulch proposals are discussed in Part 4.1, Chapter IV.

The following proposal for mitigation of impacts is taken directly from Alumet's mining plan for the Swan Lake Gulch site.

> "In the Swan Lake Gulch area, revegetation programs may be oriented toward such browse species as bitterbrush, mountain mahogany, and chokecherry to provide improved deer habitat, and coniferous trees for reforestation.

Several drainage ditches are planned to divert water from the pit site. Four settling ponds will be constructed--one (67,500 cubic feet) immediately below the mine, with retention time of 11 hours, one (7,500 cubic feet) in the headwaters, and two south and west of the mine pits. A sump to move with the mine panel will collect ground water. Clarified effluent from all ponds will be channeled through a culvert to natural drainages.

A further site-specific mitigating measure that should be required is that the proposed conveyor system be removed and the corridor be recontoured and revegetated upon completion of mining.

Additional hydrologic data should be obtained prior to construction and mining activities to permit adequate design of water and sediment control structures.

CHAPTER V
ADVERSE EFFECTS THAT CANNOT BE AVOIDED

Changes in the land surface during mining and reclamation are shown in figure 4-10.

Soils will be disturbed on 699 acres.

Air quality will be slightly lowered.

Vegetation will ultimately be removed from 699 acres, with about 200 acres cleared at any one time during most of the life of the mine. Annual forage production on 534 acres of reclaimed land will probably not exceed 200 to 800 pounds per acre, air dry weight--about half the present value. Mining will displace deer and elk from about 20 percent of the present winter range on the west flank of the Aspen Range. From 400 to 500 deer and as many as 15 elk may be lost. Breeding, nesting, and brood-rearing habitat for forest grouse will be disturbed on about 450 acres, causing the loss of as many as 250 grouse.

Impacts to fisheries are likely to minimal.

Forage will ultimately be removed from 699 acres of rangeland. Average annual production of usable forage on 534 acres of reclaimed land will probably not exceed 175 pounds per acre, air dry weight; forage on 165 unreclaimed acres will be almost totally lost.

Impacts on ground water from reduced recharge will be minimal and very localized but long term. The impacts on surface waters from increased sediment and flow changes will be large and long term.

Development of access roads and utility services to the site will reduce the natural, undeveloped character of the recreation and aesthetic resources of the area.

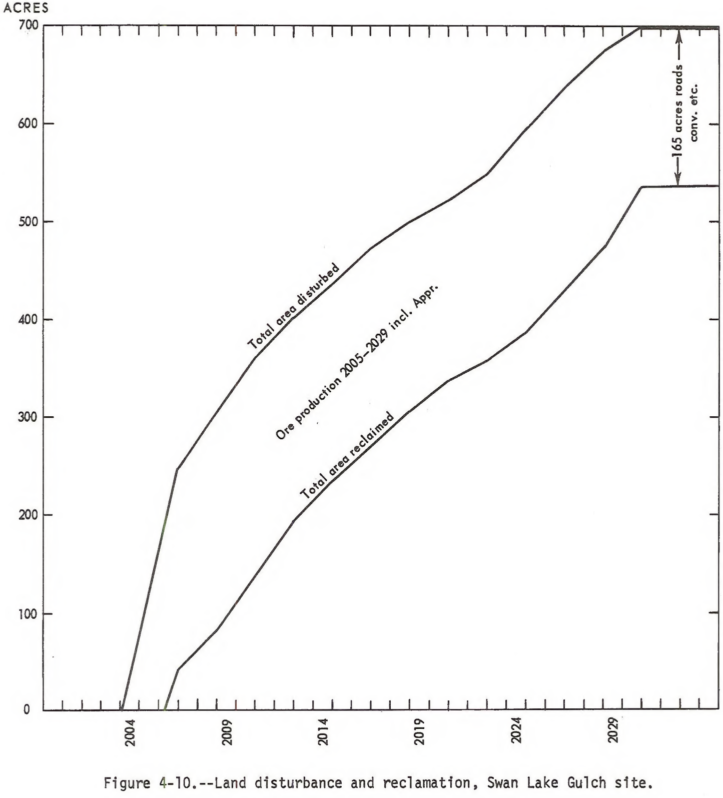

Figure 4-10.--Land disturbance and reclamation, Swan Lake Gulch site.

CHAPTER VI
SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

From 2004 to 2028, 57 million short tons of ore will be removed for calcining nearby and processing into fertilizer at a proposed plant in Utah. Mining will disturb soils on 699 acres and move 180 million cubic yards of waste rock. During mining, vegetation will be progressively removed from 699 acres; forage production of 400 to 1,600 pounds per acre, air dry weight, will be lost on about 200 acres at any given time. As many as 400 to 500 deer and 10 to 15 elk will be displaced from about 350 acres of winter range--about one-fifth of the winter range on the west flank of the Aspen Range. On the minesite, as many as 1,070 sheep months of forage, valued at $1,700 annually, will be lost during mining, because at least part of the site will not be available for grazing. The aesthetic appeal and the recreation resources of the area will be lowered during and after mining.

Annual forage production on 534 acres of reclaimed land will probably not exceed 200 to 800 pounds per acre, air dry weight--about half the present value. Production on 165 acres of unreclaimed roads and conveyor corridors will be lost. Some long-term reduction in game herds--especially deer, elk, and moose--will result from competition on nearby ranges from the displaced animals.

Average annual production of usable forage on 165 reclaimed acres will probably not exceed 175 pounds per acre, air dry weight. Production on 165 unreclaimed acres will be virtually zero. On the entire site, average production of usable forage of about 660 sheep months, valued at $1,030, will be lost annually.

CHAPTER VII
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Alumet will mine about 57 million short tons of phosphate rock at the Swan Lake Gulch site over a 24-year period. This ore contains 1.4 million short tons of fluorine, 6,300 short tons of uranium, 46,000 short tons of vanadium, and 57,000 short tons of rare earths, which will be removed but not recovered. About 1,600 acre-feet of water per year will be used for ore processing. Productivity will be reduced on 699 acres. Wildlife that cannot successfully relocate, will be lost, with consequent loss of hunting opportunity. The remote, undeveloped character of the area will be irreversibly and irretrievably changed.

Inasmuch as production is not scheduled until past the year 2000, the commitments of resources have not been determined.

CHAPTER VIII
ALTERNATIVES

Alternatives that apply to both the Diamond Creek and the Swan Lake Gulch proposals are discussed in Part 4.1, Chapter VIII.

At Swan Lake Gulch, Alumet proposes to totally backfill the pits. Because of the high stripping ratio, dumps will still remain. Partial backfilling would be an environmentally less acceptable alternative. As an alternative to the proposed access road in Swan Lake Gulch, Alumet has proposed a road along an existing jeep trail in Dry Canyon. Another alternative would be a road north from the minesite into Sulphur Canyon. Both alternative roads would be longer but would have gentler grades than the proposed road. Too few data are available to compare their impacts. All three alternatives would cross deer and elk winter range. As an alternative to transporting ore by surface conveyor belt, Alumet has proposed a conveyor belt in a tunnel. The tunnel would have less impact on the land surface, on the stream and lakes in Swan Lake Gulch, and on vegetation, wildlife, and fish. Moreover, it would have less impact on recreation and aesthetics, including noise and dust. It would, however, require additional dumps for disposal of tunnel waste convenient to the tunnel.

PART 5

BEKER INDUSTRIES CORPORATION

PART 5.1
SOUTH MAYBE CANYON MINING PLAN

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PART 5
BEKER INDUSTRIES CORPORATION

In 1972 Beker Industries Corporation acquired a fertilizer plant and phosphate-rock reserves in southeastern Idaho. With current annual production of about 3.0 million tons and anticipated production of about 4.5 million tons by 1980, Beker has become the largest producer and processor of phosphate rock in this area. Current production is from the North Maybe Canyon mine, but operations are now expanding to the South Maybe property, which is a part of the same Federal lease. Plans are to produce about 4.5 million tons in 1976: 1.5 million tons from North Maybe which will almost deplete that reserve, and the rest from South Maybe.

The Champ mine will produce 3.5 million tons of ore during 1979. The Mountain Fuel mine will produce 10 million tons over a 3-year period, beginning in 1980.

The phosphate rock will be transported from the mines by truck to the present railroad. Blended ore will be calcined and processed at the enlarged fertilizer plant at Conda.

PART 5.1
SOUTH MAYBE CANYON MINING PLAN

CHAPTER I
DESCRIPTION OF THE PROPOSED ACTION

Beker proposes to extend surface mining, as an approved continuation of operations on Federal phosphate lease I-04, to unmined areas south of their present Maybe Canyon mine (fig. 5-1). The proposed South Maybe Canyon mine will involve about 640 acres in the south half of lease I-04 south of Maybe Canyon. The property, known as the Dry Valley lease, lies along the crest of a northwest-trending ridge between Maybe Canyon and Dry Valley. The entire lease I-04 contains 1522.24 acres, all within the Caribou National Forest. About 640 acres of the lease and 180 acres of special use permit land will be involved in this mining plan, all within the Caribou National Forest. The south half of the leasehold was trenched, drilled, and sampled during the spring of 1975. Exploration drilling was done during 1974, and additional development drilling was done under an approved plan during 1975.

Subsequent to filing the original mining plan Beker Industries received USGS approval to conduct exploratory drilling on the South Maybe Canyon portion of lease I-04. Completion of the exploration increased ore tonnage estimates and provided a different waste disposal program. However the current mine plan revision, filed January 21, 1976, does not contain sufficient engineering details for final consideration of approval or disapproval under Federal Regulation 30 CFR 231. The following details are lacking at this time and will be required.

1. Sequence of waste removal, which provides large sized chert boulders for mantling the bottom and east slope of Maybe Canyon beneath the waste dump, is not shown.

2. Access slots across the highwall and haulage roads from pit to dump are not located.

3. Hydrologic study of upper Maybe Canyon has not been completed and design of alternate drainage channel, on east side of the waste dump, is not firm.

The following is taken from the mining plans for the South Maybe Canyon mine as prepared by Beker. The plans were filed July 26, 1974, with the Conservation Division, U.S. Geological Survey, Pocatello, Idaho, in accordance with 30 CFR 231.10. The proposal was further modified August 30, 1974, again on July 9, 1975, and again on January 21, 1976 to include all lands on the south half of the lease. Conditional approval to mine a 2,000-foot panel was granted by the USGS on February 24, 1975, as part of the ongoing operation. Information and data contained in an accompanying environmental analysis, prepared by Ecology Consultants, Inc., Fort Collins, Colo., and from interviews with company officials have also been used.

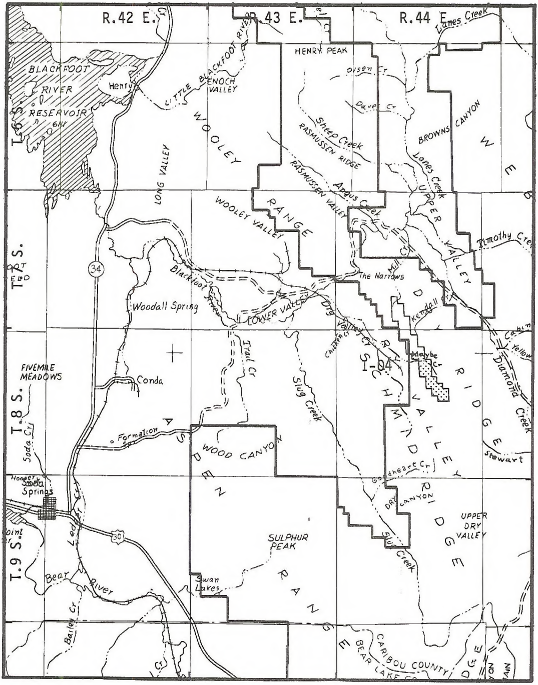

Figure 5-1.--Location of Federal phosphate lease for the proposed South Maybe Canyon mine. Pattern shows area of proposal.

A. PROPOSED MINING OPERATIONS

According to the original mining proposal, the south half of the Maybe Canyon mine will produce about 13 million tons of ore by 1979. The duration of South Maybe Canyon mining is contingent upon annual production, which, in turn, is contingent upon market conditions. The indicated production rate would deplete stated reserves in 1978.

The two 25° to 40° eastward-dipping ore zones will be mined by conventional surface-mining methods to economical depths. Mining method will be similar to that of the North Maybe Canyon mine. The proposed mining area is approximately 10,000 feet long (fig. 5-2). Mining is planned in two phases (fig. 5-3). The stripping ratio of the South Maybe Canyon mine will be about 1.8 cubic yards of waste per ton of ore recovered. Overburden will be placed on waste-dump areas outside the pit area.

Stripping ratios and production will be balanced from both the north and south halves of the lease and are engineered to yield a uniform feed to the plant at Conda. Reserves for both halves of the lease are estimated at 14.5 million tons.

Waste will be removed and disposed with scrapers in the range of 45 cubic yards per payload or with electric shovels of 14-cubic-yard capacity loading 50- to 100-ton haul trucks. Ore will be removed with frontend loaders in the 10-cubic-yard range, loaded into 50-ton trucks and delivered to the railroad loading facility.

Three waste areas are proposed in the original mining plan, (figs. 5-2, 5-3). South area No. 1, currently approved for use, lies on the upper west slope of Dry Ridge and will contain about 3 million cubic yards. South area No. 2, high on the east side of Dry Ridge, will contain just over 2 million cubic yards. South area No. 3 will fill a portion of upper Maybe Canyon to an altitude of about 7,400 feet and will contain about 15 million cubic yards; a French drain will handle discharge from several springs.

The grading and surfacing as well as revegetating will be similar to that used at the North Maybe Canyon mine. Chert cores will be veneered with waste shales, and toes and sides of dumps keyed or tied into natural ground. Sedimentation structures will be constructed where needed, with the approval of the Mining Supervisor.

In the revised plan of January, 1976, the mine has been lengthened, widened and deepened with increased ore recovery, surface disturbance and surface rehabilitation.

	Previous Plan	Current Plan
Ore Recovery	13.0 MM tons	27.7 MM tons
Surface Disturbance	383 acres	459 acres
Surface Rehabilitation	200 acres	411 acres

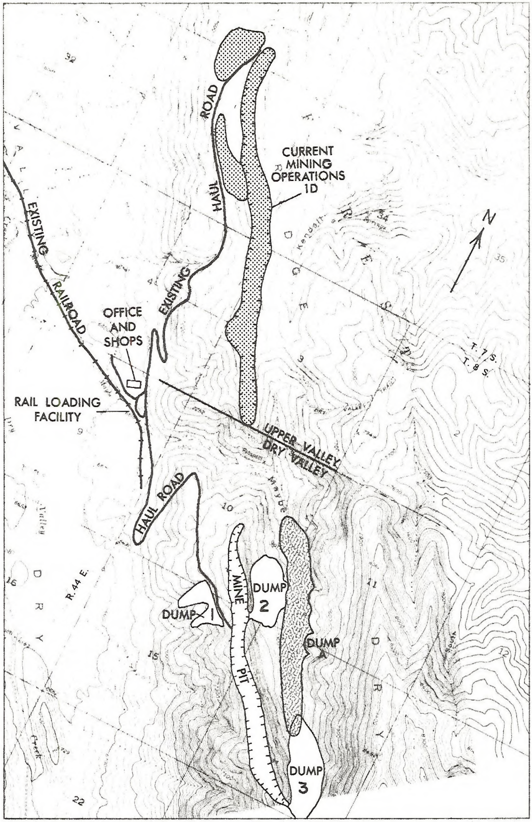

Figure 5-2.--Mining plan proposed for the South Maybe Canyon site.

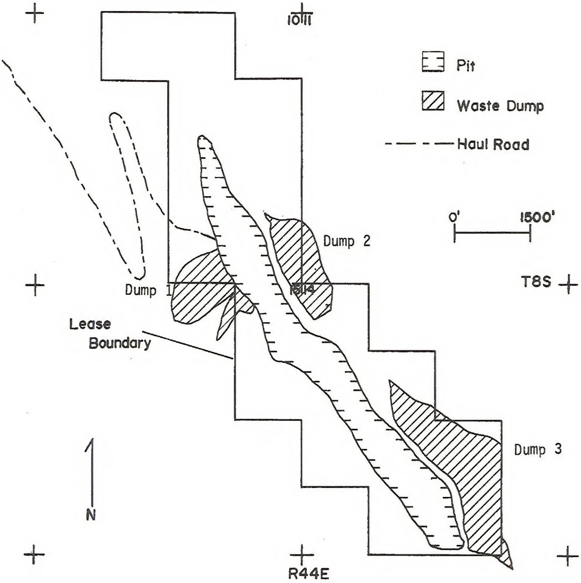

Figure 5-3.--Mining sequence proposed for the South Maybe Canyon mine.

The mining of 277 MM tons of ore at an in place stripping ratio of 2 cubic yards of waste per ton of ore will require removal of about 35 MM cubic yards of waste rock. The three waste dumps shown in Figure 5-3 are to be replaced by a single large dump in Maybe Canyon, encompassing the area of Dump No. 2 and extending southward into the area of Dump No. 3. The elimination of Dump No. 1 eliminates a large part of the visual impact of the mine as viewed from Dry Valley. The large dump presents less surface disturbance per unit volume of contained waste and allows the construction of a more stable dump that is more amenable to revegetation. The dump design provides for drainage beneath the dump and by armored channel along the east edge an armored or reinforced concrete spillway will carry drainage over and away from the dump.

The current plan is to halt mining in the North Maybe Canyon Mine in the near future, mining the South Maybe Mine to depletion, then a return to the North Maybe Mine.

B. RECLAMATION

According to the original mine plan, dumps will be shaped with face slopes not steeper than 2:1. Faces of dumps will be left smooth and compacted. The toe of the dumps will be shaped to blend with the natural topography. Tops and slopes of waste dumps will be contoured and revegetated to U.S. Geological Survey and U.S. Forest Service specifications. Seed application rates will consist of the following:

Slender wheat grass	3 lbs/acre
Smooth brome (Mamchae)	5 "
Intermediate wheat grass (Tegmar)	5 "
Pubescent wheat (Luma)	5 "
Timothy	2 "
Orchard grass	3 "
Ranger alfalfa	3 "
Winter oats or barley	4 "
Total	30 lbs/acre

Water from the waste-disposal faces will be collected and directed along the sides and toe of the dump to be diverted onto the natural ground. An open French drain will be constructed through south waste area 3 to drain water from several springs in Maybe Canyon and from a snowmelt collection pit on the top center of the dump.

Of the 820 acres on the South Maybe Canyon minesite approximately 130 acres will be pit, 200 acres will be covered by waste dumps, and 53 acres will be disturbed by roadways. Approximately 200 acres will be rehabilitated.

Under the revised mining plan, the mine pit will be completely backfilled for about two-thirds of its approximate 11,000-feet length, and the top of the fill will be blended into the adjoining undisturbed topography. The remaining third of the pit length, the terminal pit, will be left unfilled; however, the footwall slope is gentle enough to be revegetated, and the pit-fill slope at the north end of the terminal pit will be graded to meet requirements for revegetation. Thus, the only areas not scheduled for revegetation are about 12 acres of highwall in the terminal pit, and about 36 acres on the north slope of the dump where that face will be mantled with chert to prevent erosion.

C. SURFACE FACILITIES

Few new structures are planned. The shop area and necessary sanitation structures will be built on private land near the present office area. Any facilities constructed on the lease will be temporary and will be removed on completion of mining and the area restored. Sanitation facilities will be located and constructed to specifications mutually agreed upon by Beker Industries, the Forest Service, and the U.S. Geological Survey. The mining plan does not discuss electrical power requirements, source, or transmission route.

In-pit roads will change during various phases of the mining, but permanent or long-lived roads will be built as specified by the approved mining and haul-road plans. Location and specifications for safety turn-outs for runaway trucks are to be constructed as mutually agreed upon by the U.S. Geological Survey, the Forest Service, and Beker.

The proposed haul road from the present loading facility to the minesite crosses approximately 2,600 feet of private property owned by Beker, approximately 9,600 feet of Forest Service lands, and approximately 2,200 feet on the Idaho-04 lease.

CHAPTER II
DESCRIPTION OF THE EXISTING ENVIRONMENT

A. NATURAL ENVIRONMENT

1. CLIMATE

The general climate of the area is described in Part 1. Temperatures at the proposed South Maybe Canyon mine are likely about 6 degrees cooler than at Conda, growing seasons shorter, and annual precipitation averages about 9 inches greater. Data from the Idaho Bureau of Mines and Geology (Ralston and Trihey, 1975) indicate that deeper snowdrifts accumulate on the north and east slopes than on the south and west slopes. Because the site is on a steep northeast slope, heavy accumulations of snow which last into late spring are likely.

2. LAND RESOURCES

a. Land Surface

The general topography of the minesite is shown on figure 5-2.

The site is on the crest of a small subsidiary ridge, separated to the east from northwest-trending Dry Ridge by Maybe Canyon, a small canyon with a steep gradient, and bordered to the west by Dry Valley and, beyond it, Schmid Ridge. The highest point in the mine area is at 7,986 feet, about 1,400 feet above the floor of Dry Valley.

b. Geology and Mineral Resources

At the site, the Meade Peak strikes about N. 40° W. and dips about 35° E. It is about 200 feet thick, and the total thickness of the lower and upper phosphate zones is about 60 feet. The structure of the Meade Peak appears to be simple on most of the site. The company plans to produce at least 13 million short tons of phosphate rock. Estimates of the total resources of some significant elements in the phosphate ore are: 310,000 short tons of fluorine, 1,400 short tons of uranium, 10,000 short tons of vanadium, and 13,000 short tons of rare earths.

c. Soils

The distribution of landtypes on the entire leasehold is shown in figure 5-4. Their characteristics are given in table 5-1.

On the south half of the lease, there are 140 acres of landtype 2, 35 acres of landtype 31, 35 acres of landtype 41, 215 acres of landtype 41-1, and 215 acres of landtype 54. The land use permit area consists of 20 acres of landtype 41 and 160 acres of landtype 41-1.

Landtype 2 consists of smooth to very slightly dissected north-south oriented ridgetops 0.5 to 5 miles long. They have nearly barren slopes with low-growing vegetation and occupy some of the highest elevations of the area. Depth to bedrock is 0 to 3 feet. The soils range from shallow to moderately deep and are loamy-skeletal.

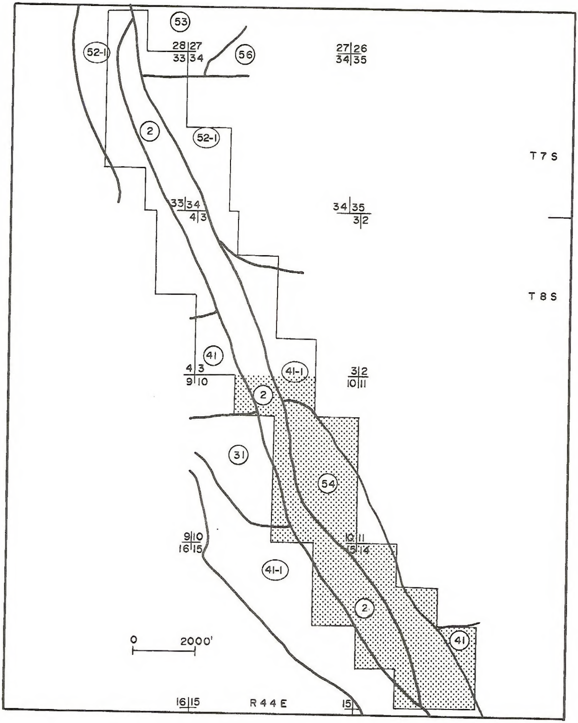

Figure 5-4.--Landtypes near the South Maybe Canyon site. Pattern shows area of proposal.

Table 5-1.--Physical characteristics of soils at South Maybe Canyon minesite. VL = very low, L = low, M = moderate, H = high, VH = very high

Land-type	Soil families	Percent of area	Erosion in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road Construction hazard	Slope range, in percent	Revegetation potential
				Depth in inches	Suitability					
2	Argic Cryoborolls, loamy-skeletal, mixed	45	0.051	10	H	4.5	VL	H	45-60	VL
	Mollic Cryoboralfs, fine-loamy, mixed	20	.061	6	M	7.2	L	M	25-35	L
	Pachic Cryoborolls, fine-loamy, mixed	14	.066	12	H	6.0	VL	H	35-45	L
	Typic Cryorthents, fine-loamy, mixed	15	.012	6	M	4.3	VL	L	0-10	L
	Lithic Cryoborolls, loamy-skeletal, mixed	5	.172	6	L	3.4	M	VH	50-60	VL
31	Mollic Cryoboralfs, loamy-skeletal, mixed	70	.021	6	L	8.8	L	M	35-50	M
	Typic Cryoborolls, fine-loamy, mixed	10	.005	8	M	7.0	L	M	30-45	M
	Typic Cryoborolls, loamy-skeletal, mixed	20	.009	8	M	4.5	VL	L	20-25	L

Table 5-1.--Physical characteristics of soils at South Maybe Canyon minesite--Continued

Land-type	Soil families	Percent of area	Erosion in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road Construction hazard	Slope range, in percent	Revegetation potential
				Depth in inches	Suitability					
41	Calcic Pachic Cryoborolls, loamy-skeletal, mixed	55	0.075	10	M	3.9	L	H	30-70	VL
	Argic Pachic Cryoborolls, loamy-skeletal, mixed	20	.032	10	H	5.7	L	H	20-50	L
	Lithic Cryoborolls, loamy-skeletal, mixed	15	.023	4	L	3.4	VL	M	20-30	VL
	Argic Cryoborolls, loamy-skeletal, mixed	10	.045	8	L	4.5	L	H	40-60	L
41-1	Calcic Cryoborolls, loamy-skeletal, mixed	75	.041	6	L	4.6	M	H	40-60	VL
	Lithic Cryoborolls, loamy-skeletal, mixed	15	.052	6	M	3.4	L	VH	20-30	VL
	Mollic Cryoboralfs, loamy-skeletal, mixed	5	.017	8	L	8.8	L	M	50-60	M
	Argic Pachic Cryoborolls, loamy-skeletal, mixed	5	.010	12	M	5.7	M	M	35-45	H

Table 5-1.--Physical characteristics of soils at South Maybe Canyon minesite--Continued

Land-type	Soil families	Percent of area	Erosion, in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road construction hazards	Slope range, in percent	Revegetation potential
				Depth, in inches	Suitability					
54	Mollic Cryoboralfs, loamy-skeletal, mixed	45	0.061	6	L	8.8	L	M	35-50	H
	Mollic Cryoboralfs fine-loamy, mixed	30	.018	6	L	7.2	L	M	40-55	M
	Lithic Cryoborolls, loamy-skeletal, mixed	20	.012	4	M	3.4	VL	H	15-35	L
	Typic Cryorthents, loamy-skeletal, mixed	5	.004	0	L	5.2	M	H	30-50	M

Landtype 31 occurs on all aspects. It consists of weakly dissected valley sideslopes that occupy most of the major valley systems. The dominant drainage pattern is dendritic. Slope relief ranges from 500 to 1,000 feet. Bedrock is 3 to 6 feet deep over about 70 percent of the area, 2 to 3 feet deep elsewhere. The soils are moderately deep to deep loamy-skeletal over bedrock.

Landtype 41 consists of smooth escarpments on south and west aspects. Slope lengths range from 500 to 2,500 feet. The weakly-defined parallel drainages are intermittent, with flow occurring at intervals of 5 to 10 years. Soils are shallow to deep, loamy-skeletal, mixed, over hard bedrock.

Landtype 41-1 is described in Part 4.1, Chapter II.

Landtype 54 occurs on all aspects of steep, short, slightly convex slopes and sharp ridges generally at the head of major drainages. Slope lengths range from 500 to 1,000 feet. Some ponds are present. Soils are moderately deep to very deep, fine-loamy and mixed over 30 percent of the area; and loamy-skeletal and mixed over 70 percent of the area. Depth to bedrock is 20 to 40 inches over 20 percent of the landtype and 40 inches or more over the remaining 80 percent.

3. WATER RESOURCES

a. Water Supply

1. Surface Water

The minesite drains into Maybe Canyon, which in turn drains northwest into Dry Valley Creek. Drainage from the minesite reaches Dry Valley Creek for only short periods during most years. The total drainage into the pit is about 130 acres. The pit area may catch sufficient snow from drifting to yield about 18 inches of water, on the average, over the pit area, or roughly 200 acre-feet per year. Distribution of this estimated yield between surface runoff and underground flow is not known. Present surface flows at the minesite are minimal.

2. Ground Water

The general ground-water conditions are described in Part 1. The site contains little, if any, ground water at depths to be mined, although some small inconsequential perched ground-water bodies may exist.

b. Water Quality

Detailed water-quality data for the Maybe Canyon minesite are represented by a series of samples collected in late 1974 and early 1975. Samples were collected during base flow from Maybe Creek at the Caribou National Forest boundary. Partial chemical analyses show the following ranges and averages for different parameters (Forest Service data):

Parameter	Number of measurements	Range	Average
Discharge (cfs)	11	0.23-0.98	0.73
Bicarbonate as HCO_3 (ppm)	11	242-264	252
Total Kjeldahl nitrogen as N (ppm)	11	1.1-5.8	2.2
Total Phosphorus as P (ppm)	11	0.01-0.25	.06
pH	2	7.4,8.1	--
Hardness as $CaCO_3$ (ppm)	11	184-244	198
Dissolved solids (ppm)	10	230-250	241
Suspended sediments (ppm)	11	0-21	10
Turbidity (F.T.U.)	10	0.6-4.8	2.2

Analyses for samples from the same site collected during the snowmelt runoff period March 18, 1975 to April 28, 1975 showed the concentration ranges and averages indicated below.

Parameter	Number of measurements	Range	Average
Bicarbonate as HCO_3 (ppm)	9	210-237	226
Total Kjeldahl nitrogen as N (ppm)	9	1.9-9.8	3.4
Total dissolved phosphorus as P (ppm)	9	0.11-0.28	0.17
Total Phosphorus as P (ppm)	9	.16-1.4	0.35
ph	7	8.2-8.9	--
Hardness as $CaCO_3$ (ppm)	9	176-194	186
Dissolved solids (ppm)	9	230-255	240
Suspended sediments (ppm)	9	21-20,000	see text
Turbidity (F.T.U.)	9	.3-300	see text

For April 7 and 9, the turbidity readings were 22 and 300 F.T.U. (Formazin Turbidity Units), respectively. All other values were less than 10 F.T.U. Suspended sediment concentrations for April 7, 9, 14, 16, 21, and 23 were 1,170, 19,700, 1,090, 518, 194, and 118 ppm, respectively. Other values ranged from 21 to 41 ppm.

Dissolved total phosphorus concentrations measured on the samples shown above, but not on the samples collected fall 1974 represent organic and inorganic forms of phosphorus measured on filtered samples.

Failure of a sediment pond at a presently operating mine caused sediment to completely cover the site from which the samples (data shown above) were collected. Suspended sediment data for sites on the stream from nearby locations are tabulated below:

Date	One-fourth mile above National Forest Boundary	100 Yards above National Forest Boundary	250 Yards below National Forest Boundary
		(Parts per million)	
April 30, 1975	16	24	219
May 5, 1975	4	20	346
May 9, 1975	24	21	248
May 13, 1975	6	--	1,250
May 19, 1975	37	2,900	8,040
May 29, 1975	45	455	1,330
June 2, 1975	18	158	278
June 9, 1975	130	117	1,280
June 16, 1975	--	73	76
June 24, 1975	45	34	36

Data in the first column above represent samples collected upstream from mine disturbances, whereas the other data, including those from the site covered by the mud-flow, are downstream from mine-disturbed land.

The dispersal of trace elements by events such as the sediment pond-failure at Maybe Canyon would occur largely in particulate phases. No determinations for trace constituents are available for samples representing the period of the pond failure or for other periods of high sediment concentrations. However, on the basis of solubility considerations (see Part 1), the concentrations in true solution of potentially toxic elements are likely to be quite low (see also data for Kendall Creek mentioned later). Concentrations for low flow in Maybe Creek are shown in table 1-11, and are comparable to analyses for other streams. Although during periods of erosion the total concentrations (particulate plus soluble) of the trace elements may be quite significant the dissolved concentrations are not likely to greatly exceed those for low flow where particulate material concentrations are low. An exception here might be the element vanadium which may not be subject to the same solubility controls as other cationic trace elements.

Kendall Creek is near the present North Maybe Canyon mine and drains toward Diamond Creek. A series of 16 partial analyses showed suspended solids concentrations to be quite low (0-59 ppm) considering that the period (April to June, 1975) included the time of snowmelt runoff. Turbidity values ranged from 0.2 to only 4.2 F.T.U.

Concentrations of certain trace constituents are quite low in Kendall Creek, considering that measurements were made on unfiltered-acidified samples. Results for one set of measurements for a sample collected August 27, 1974, are shown below.

	Total Values (Micrograms per litre)		Total Values (Micrograms per litre)
Arsenic	0 [1]	Selenium	0
Cadmium	0	Vanadium	0
Chromium	2	Zinc	3
Copper	5		

[1] Concentrations reported as 0 are less than detectable amounts.

Data are also available for samples from 12 sites collected and analyzed by Beker in 1974; these data were reported in the environment analysis that accompanied the mining plan and are summarized here in table 5-2. For consistency, parts per million (ppm) of P_2O_5 are expressed here as ppm of total phosphorus (as P) (ppm P_2O_5 X 0.4364 = ppm P). Suspended solids and fluoride are also in parts per million; dissolved oxygen, in milligrams per litre; and turbidity, in Jackson Turbidity Units. It appears that Beker's reported "solids" refer to suspended solids and have been so reported here. Values in some cases have been rounded off to more nearly reflect probable precision of methods. The locations of the stations are as follows:

1. In Maybe Canyon above road in south end of APC (Beker) claims.
2. In Maybe Canyon above back road into present mining area.
3. At mouth of Maybe Canyon.
4. At mouth of Big Draw coming from present dumping area.
4a. Below junction of Maybe Creek and drainage at Big Canyon.
5. Above junction of Maybe Creek and Dry Valley Creek on Dry Valley Creek.
6. Above highest beaver dam in Mill Creek Canyon.
6a. On Mill Creek, west of Diamond Creek Road.
7. On Kendall Creek 300 yards west of Diamond Creek Road.
8. On Dry Valley Creek above Dry Valley Creek Narrows, 1.6 miles above Blackfoot River.
9. Blackfoot River Bridge at upper Allen Ranch.
10. Blackfoot River at the upper diversion dam.

Compared to other streams of the area, suspended sediment concentrations and turbidity values are quite high for samples taken at Station 4 at the mouth of Big Draw (below the waste dumps of the North Maybe Canyon mine) where the maximums were 2,380 ppm and 410 J.T.U., respectively. Although no discharge data were given, it seems likely from the sampling dates that some of the higher values occurred during the period of snowmelt runoff.

Values for pH between 7.5 and 8.8 recorded at the Beker stations, are characteristic of most waters of the study area. Fluoride concentrations are low. Beker's data for phosphorus apparently represent that leached and dissolved from particulate material as well as that dissolved in the water under in-place conditions. Accordingly, high concentrations of phosphorus coincide with high sediment concentrations.

Table 5-2.--Water-quality data near Maybe Canyon site in 1974

Site	Period sampled	Number of samples	Dissolved oxygen	Total phosphorus	Suspended solids	Turbidity	Fluoride	pH
1	May 28-June 17	3	8-10	1.3-5.7	380-1,695	145-250	0.13-0.24	8.05-8.40
2	May 6-June 17	6	8-11	.00-.76	21-155	12-67	.09-.20	8.25-8.55
3	April 8-June 17	8	8-10	.03-1.3	34-195	13-39	.08-.20	8.35-8.60
4	April 22-May 21	4	7-9	1.4-927	118-2,380	105-330	.13-.37	7.50-8.45
4a	April 22-June 17	6	7-8	.33-217	32-1,080	18-410	.13-.24	7.75-8.80
5	April 15-June 17	8	8-12	.00-2.0	"nil"-227	6-76	.05-.11	7.95-8.55
6	May 22-June 17	4	9-9	.00-1.2	12-75	7-25	.06-.14	8.20-8.60
6a	May 6-June 17	6	9-10	.00-.44	"nil"-49	5-12	.06-.11	8.15-8.55
7	May 6-June 17	6	8-10	.00-.22	0-31	2-6	.05-.10	8.30-8.55
8	April 8-June 17	9	7-11	.00-1.9	0-86	7-33	.04-.12	7.50-8.50
9	April 15-June 17	8	9-12	.00-.65	25-106	14-42	.04-.11	8.15-8.55
10	May 6-June 17	6	8-10	.00-1.9	22-67	16-38	.04-.11	8.15-8.60

The very high phosphorus concentration (927 ppm as P) shown for one analysis of water from the "mouth of Big Draw coming from present dumping area" (station 4) occurred at the same time when the suspended solids concentration was 2,380 ppm. Although that analysis along with others suggest that most of the phosphorus is associated with particulate material rather than being in true solution, analytical and (or) sampling errors are suggested here because 2,380 ppm of sediment cannot account for 927 ppm P even if the ore contained 31 percent of phosphorus as P_2O_5. However, the general conclusion that most of the phosphorus came from the sediment is valid and suggests the importance of controlling erosion products from mine wastes, in order to prevent mobility of the nutrient phosphorus.

4. AIR RESOURCES

In general, the air quality in the vicinity of the proposed minesite is good. Some particulates enter the air from the present mining adjacent to the site. No quantitative data on this are available, but estimates of 0.5 pounds per ton at the active mine have been made. The amounts are greatest during hot, dry summer months under moderate wind conditions. Some dust and particulates also enter the air along roads in the vicinity as a result of vehicular traffic.

5. VEGETATION

The minesite has about 200 acres of conifer-aspen, including 800,000 board-feet of conifer timber, 40 acres of mountain-brush, and about 580 acres of sagebrush-grass.

No rare or endangered plants are known on the leasehold.

6. WILDLIFE

Forty-seven species of birds, 24 species of mammals, and 5 species of reptiles have been identified in the area.

An elk calving ground exists 1 mile or less west of the proposed South Maybe Canyon mine. An aerial survey in May 1974 by the Idaho Fish and Game Department identified at least 12 cow elk using an area closer to the project area than any identified in earlier surveys. These areas are shown on map 8. Deer and elk use the site year round except during deep snow in winter. As many as 50 deer and 25 elk may use the area. Three significant deer and elk migration routes that allow movement between Dry Valley and Diamond Creek are located in this area, one less than 1 mile northwest of the minesite, another crossing it, and the third less than one mile south of the site. Blue grouse and ruffed grouse are common on the side slopes and near the ridgetops. Several moose have been observed on the site, and bear occasionally cross the site.

Dry Valley--1 mile west of the South Maybe Canyon site--provides habitat for greater sandhill cranes, and habitat considered suitable also for whooping cranes.

Small birds include the Vesper sparrow, robin, meadowlark, mountain bluebird, magpie, snipe, and mountain chickadee. Raptors include the Golden eagle, red-tailed hawk, kestrel, shorteared owl, and great horned owl. Both hunting and nesting areas occur at the leasehold.

No threatened or endangered species have been observed on the leasehold.

7. FISHERIES

There are no significant fisheries on or near the minesite. Maybe Creek, below the leasehold, contains a few small cutthroat trout. Streams on the leasehold are ephemeral.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

The South Maybe Canyon lease is part of a National Forest grazing allotment, used from June 21 to September 15 by 1,200 sheep which annually consume approximately 3,300 sheep months of feed, valued at about $5,100. The allotment is used in conjunction with the grazers' private and leased land and comprises a significant portion of the grazing operation. The acreage to be disturbed by mining is 4 percent of the allotment.

2. SOCIOECONOMIC DEVELOPMENT

The South Maybe Canyon mine will be the southward extension of an ongoing operation that employs about 150 people.

3. TRANSPORTATION AND UTILITIES SYSTEMS

A 54-foot-wide haul road was completed in 1975. The 2.7-mile haul road begins near the North Maybe Canyon mine rail-load-out facility and proceeds southward across the southwest-facing slope of Dry Ridge to the northern end of the minesite. Maximum grade is about 7 percent with ½:1 cut and 2:1 fill slopes. About 1.7 miles of the route crosses land administered by the Forest Service, and the remaining 1 mile is on private land.

About 2 miles of the Maybe Canyon-Stewart Canyon road are within the lease boundaries. This single-lane, unsurfaced road follows Maybe Creek southeastward to the Maybe Creek-Stewart Canyon drainage divide and then descends into Stewart Canyon to Diamond Creek. The road receives very limited use during the summer and fall.

No utility systems are located within the lease boundaries.

4. RECREATION RESOURCES

The Maybe Canyon-Stewart Canyon road is utilized as part of a loop route to the Diamond Creek and Blackfoot River areas. The ridge area on the Maybe Canyon lease is popular as a big-game and bird hunting area. Some fishing occurs in the valley streams near the proposed minesite. Snowmobiling, hiking, horseback riding, and motorcycling are growing in popularity in the area, but are primarily restricted to the road corridors by the steep terrain.

5. ARCHEOLOGIC AND HISTORIC VALUES

In July, 1975, Professor B. Robert Butler, Associate Professor of Anthropology, Idaho State University, conducted in archeologic survey of the leasehold. No archeologic or historic materials were found, and an archeological clearance was recommended.

6. AESTHETICS

Most of the minesite is within the middleground viewing zone of the road in Dry Valley and has moderate visual variety. Mining activities at the adjoining North Maybe Canyon mine, in the foreground viewing zone of the road, and the extensive mineral exploration on the site have reduced the desirability for uses dependent on aesthetic quality in the area. Discordant elements, although not numerous in the landscape, diminish its visual qualities.

CHAPTER III
ENVIRONMENTAL IMPACTS

A. NATURAL ENVIRONMENT

1. LAND RESOURCES

a. Land Surface

Mining will create 130 acres of pit and 200 acres of dumps. An additional 53 acres will be modified by roads and other facilities associated with the mining. The open pit will be 10,000 feet long, up to 700 feet wide, and 250 feet deep in the first phase of mining. About 20 million cubic yards of waste rock will be placed in dumps.

Waste dumps will be smoothed and have a low profile.

b. Geology and Mineral Resources

Mining will remove at least 13 million short tons of phosphate rock, which will include 310,000 short tons of fluorine, 1,400 short tons of uranium, 10,000 short tons of vanadium, and 13,000 short tons of rare earths. Only the phosphate resource will be utilized.

c. Soils

Mining will disturb soils on 383 acres, at a rate of 120 acres per year during the first 1.5 years of mining and at 70 acres per year during the remaining 3 years.

2. WATER RESOURCES

a. Water Supply

1. Surface Water

Maximum flows in nearby streams indicate that Maybe Creek which drains about 1.9 square miles, could flow at rates as high as 150 cfs. Probably flows this high have not occurred recently, but mining activities could raise them to this level. Annual runoff above the mining activities could total about 3,000 acrefeet. Operating plans to dispose of surface runoff from disturbed areas into the natural ground may cause accumulated sediment at locations where it could be moved by large floods into perennial streams, causing progressively larger sediment movement in the future. Increased surface flows may enable Maybe Creek flows to reach Dry Valley Creek more often and for longer periods each year; uncontrolled flows and sediment movement could impact strongly on Dry Valley Creek and the Blackfoot River.

2. Ground Water

Because the mine is near the top of the ridge, there will be only slight impacts on the ground water.

b. Water Quality

Streams that drain the area are intermittent, and transport of sediment to important streams that support fisheries may be limited to snowmelt periods.

The Forest Service estimates that sediment loads in Maybe Creek will increase during mining to 9 to 18 times present loads and decline to 2! to 5 times present loads after mining; the present sediment load is low, but it will be high to very high during mining and moderate to high after mining.

Cumulative downstream effects of these estimated increases are described in Part 1.

3. AIR RESOURCES

There will be little additional impact on the air resources from the proposed mining, which will be a continuation of the present mining on the leasehold.

4. VEGETATION

Vegetation will be progressively removed from 383 acres, of which about 270 acres are conifer-aspen, 75 acres are sagebrush-grass, and 40 acres are mountain brush. About 800,000 board feet of conifer timber will be removed.

5. WILDLIFE

An estimated 383 acres of wildlife habitat will be altered at the site.

The mine pits will limit travel on three migration routes across and along Dry Ridge. The major travel routes for elk, moose, and deer are in the wooded draws that lead to natural saddles on Dry Ridge.

As many as 50 deer and 25 elk that use the area will likely be lost or possibly displaced to other ranges, adding stress to the present carrying capacity of the winter ranges on Dry Ridge and Schmid Ridge. Excellent sage grouse and greater sandhill crane habitats, particularly in Upper Dry Valley, will be altered, causing the loss of a moderate number of grouse and some sandhill cranes.

6. FISHERIES

The proposed South Maybe Canyon mine will probably lower the quality of the marginal offsite fishery in Maybe Creek.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Forage will be progressively removed from 383 acres of rangeland with an estimated average annual production of about 400 pounds of usable forage per acre, air dry weight. During the life of the mine, as many as 775 sheep months, valued at $1,200 annually, will be lost on at least part of the site; some additional forage may be lost on adjacent lands.

In addition to decreasing available forage, the altered topography will restrict or eliminate traditional grazing patterns.

2. SOCIOECONOMIC DEVELOPMENT

The proposed mining operations of Beker will employ about 200 people and is a continuation of ongoing mining. The social and economic impacts at the sites are minimal and by themselves are not significant. However, the cumulative effects of this and other proposed mines on the region are significant and are described in Part 1.

3. TRANSPORTATION AND UTILITIES SYSTEMS

About 4,000 feet of the road in Maybe Canyon will be covered by the proposed dump.

4. RECREATION RESOURCES

The proposed mining will have major impacts on hunting, pleasure driving, snowmobiling, and other outdoor activities at the proposed South Maybe Canyon mine.

5. ARCHEOLOGIC AND HISTORIC VALUES

There will be no known impacts.

6. AESTHETICS

Mining will extend aesthetic impacts southward along Dry Ridge. Impacts will be high because of proximity to roads.

CHAPTER IV
MITIGATING MEASURES

This chapter discusses general mitigating measures that apply to the South Maybe Canyon, Champ, and Mountain Fuel proposals; in addition, it discusses measures that apply specifically to South Maybe Canyon.

State and Federal laws, regulations, and administrative policies that require mitigation or reclamation of mining impacts, and requirements of the surface-management agencies and the USGS District Mining Supervisor are discussed in Part 1, Chapter IV. These mitigating measures shall be required at all three minesites. Other possible mitigating measures as discussed in Part 1, Chapter IV, shall also be required as appropriate.

The following proposals for mitigating impacts are taken from Beker's mining plans for all three minesites.

All disturbed areas, excluding pits, will be revegetated to USGS and Forest Service specifications using a mixture of grasses and legumes. Surface facilities at all sites will be removed after mining, and surfaces reclaimed.

Since this mine plan has provisional approval, operations are already underway. Some of the practices proposed by the original mine plan have been modified by amendments and USGS direction. The measures discussed below are those included in the original plan as well as those added by recent amendments.

Beker has proposed the following specific measures for the South Maybe Canyon site.

The excavation down the highwall will be made at slopes with or without benches to conform with sound engineering and mining practices. In order to minimize disturbance to several springs in Maybe Canyon, south dump area #1 will be designed with a French drain to allow water discharge down the canyon. Grading and surfacing, as well as revegetation, will be done in accordance with plans approved by USGS. Sedimentation structures will be provided as required. Of the 383 acres disturbed by mining, approximately 200 acres will be revegetated.

Additional hydrologic data are needed for possible modification of the water-control measures.

CHAPTER V
ADVERSE EFFECTS THAT CANNOT BE AVOIDED

Changes in land surface configuration are unavoidable (fig. 5-5); 183 acres will not be reclaimed.

Progressive disturbance of soils on 383 acres at the South Maybe Canyon mine cannot be avoided during the mining operations.

Increases in sediment loads both during and subsequent to mining cannot be avoided. These increased loads will range from high to very high during mining and from moderate to high after mining. Should company-proposed surface-water control devices and the French drain at the South Maybe Canyon site fail to accommodate snowmelt runoff, increased erosion, sedimentation, and degraded water quality cannot be avoided; present capacities, as designed, could be exceeded.

Some dust and emissions from vehicles during the mining operations are unavoidable.

Vegetation will ultimately be removed from 383 acres, with about 200 acres cleared at any one time during most of the life of the mine. Annual forage production on 200 acres of reclaimed land will probably not exceed 200 to 700 pounds per acre, air dry weight--about half the present value. Production on 183 acres of unreclaimed land will be lost; 800,000 board-feet of conifer timber will be removed.

The loss and/or displacement of up to 25 elk and 50 deer from 383 acres of habitat at the Maybe Canyon site cannot be avoided. Disturbance to 3 migration routes cannot be avoided. Loss of sandhill crane habitat about 1 mile west of the site and year-round grouse habitat at the site is also unavoidable.

Reduction in quality of the limited fisheries in Maybe Creek probably cannot be avoided during mining.

Forage will ultimately be removed from 383 acres of rangeland. Average annual production of usable forage on about 200 acres of reclaimed land will probably not exceed 200 pounds per acre, air dry weight; forage on 183 unreclaimed acres will be almost totally lost.

Mining will have severe adverse effects on hunting and pleasure driving and will extend aesthetic impacts southward along Dry Ridge. The elimination of public travel on the road in Maybe Canyon cannot be avoided during the mining operation.

There will be no known impacts on archeologic or historic sites.

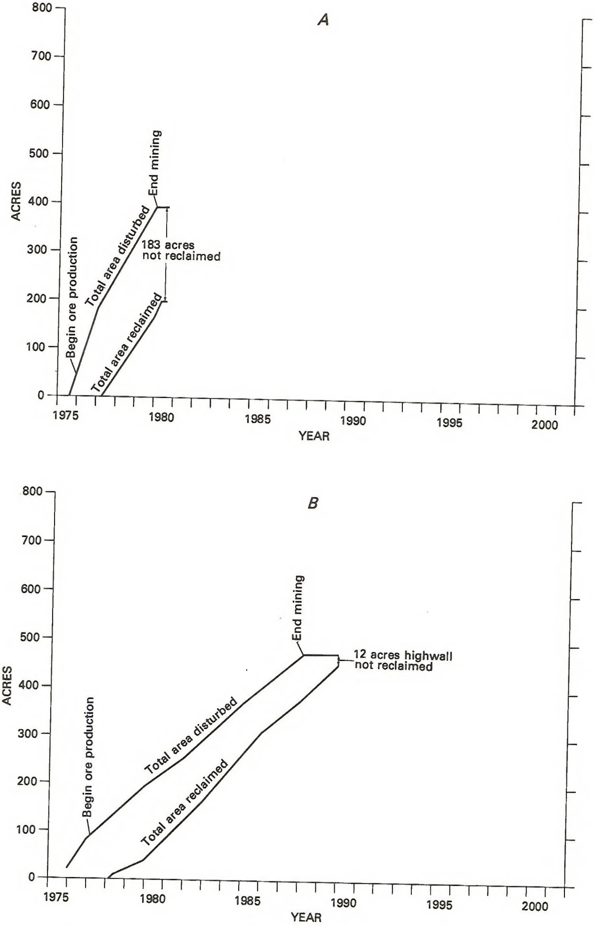

Figure 5-5.—Land disturbance and reclamation, South Maybe Canyon site. *A*, Based on mining plan as submitted for approval. *B*, Based on revised level of mining.

CHAPTER VI
SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

From about 1976 through 1979, 13 million short tons of phosphate rock will be removed for processing into fertilizer at Conda. Soils will be disturbed on about 383 acres, and about 35 million cubic yards of overburden and bedrock will be moved.

There will be an increase in runoff with accompanying high sediment loads during mining; this will decline after mining. There will also be some short-term lowering of air quality resulting from dust and vehicular emissions associated with the mining. The mining activities will also significantly lower the aesthetic quality and recreation resources during operations.

During mining, vegetation will be progressively removed from 383 acres; forage production of 400 to 1,400 pounds per acre, air dry weight, will be lost on about 200 acres at any given time. Wildlife will be disrupted and forced to move to adjacent ranges in competition with other animals. As many as 50 deer and 25 elk will be affected. On the minesite, as many as 775 sheep months of forage, valued at $1,200 annually, will be lost during mining, because at least part of the site will not be available for grazing. Long-term productivity of the area will be decreased. Annual forage production on 200 acres of reclaimed land will probably not exceed 200 to 700 pounds per acre, air dry weight--about half the present value. Production on 183 acres of unreclaimed ponds and highwall will be lost. After reclamation, forage production will be totally lost on 183 acres, and will probably not exceed about 400 pounds per acre air dry weight--half its present level--on 200 reclaimed acres.

There will be some long-term effect on wildlife in the area as a result of competition on adjacent ranges from animals displaced from the area. The loss of remoteness as a result of new or improved access to the area will also be long term. Average annual production of usable forage on 200 reclaimed acres will probably not exceed 200 pounds per acre, air dry weight. Production on 183 unreclaimed acres will be virtually zero. On the entire site, average production of usable forage of about 575 AUM's, valued at $3,375, will be lost annually. The loss of remoteness as a result of new or improved access to the area will also be long term.

CHAPTER VII
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

About 13 million short tons will be mined and processed by 1980. This is irretrievable. This ore contains 310,000 short tons of fluorine, 10,000 short tons of vanadium, 1,400 short tons of uranium, and 13,000 short tons of rare earths, which will be removed but not recovered. The landscape changes created by pits and dumps are largely irreversible. Reduction of productivity on about 383 acres with attendant reduction in forage is irreversible. Loss of wildlife, to the extent that it cannot relocate successfully, is also irretrievable. The remote, undeveloped character of the area will be irreversibly and irretrievably committed to the intrusion of mining-related changes. Primitive recreation resources and hunting and nature-study opportunities will also be irretrievably lost.

The mining and reclamation of disturbed areas will require about 4.3 million gallons of diesel fuel, 520,000 gallons of gasoline, as well as unknown amounts of lubricants and explosives. Minor amounts of construction materials will be required for service facilities; these materials will be lost to other uses.

Transportation of the ore from the mine to the processing plant at Conda will require 1.1 million gallons of diesel fuel.

Beneficiation of the ore will require about 100 million kilowatt-hours of electricity, about 42 billion cubic feet of natural gas, about 52,000 gallons of gasoline, and about 15,900 acre-feet of water. Converting the calcined rock to fertilizer will require about 1.1 billion kilowatt-hours of electricity, 52,000 gallons of gasoline and 12 million tons of sulfuric acid. These resources will be lost to other uses.

CHAPTER VIII
ALTERNATIVES

This chapter discusses alternatives that apply to all three proposals; in addition, it discusses alternatives which apply specifically to the South Maybe Canyon proposal.

The general administrative options available to the Secretary of the Interior are discussed in Part 1. If one or two of the proposed plans were rejected, Beker would probably intensify ongoing mining at the Maybe Canyon mine, quite possibly with higher stripping ratios. Impacts would be generally the same as those noted for the South Maybe Canyon proposal.

The following alternative applies to the South Maybe Canyon site.

Beker has proposed the alternative of blasting the highwall to yield a gentler slope, which would eliminate the cliff-like appearance of the unmodified highwall, but would reduce vegetation production on more area.

PART 5.2
CHAMP MINING PLAN

CHAPTER I
DESCRIPTION OF THE PROPOSED ACTION

The proposed Champ mine involves Federal phosphate lease I-04979 (fig. 5-6). The lease lies at the south end of Dry Valley, approximately 6 miles south of Beker's operating Maybe Canyon mine and their developing South Maybe Canyon mine. The lease contains 321.25 acres, all within the Caribou National Forest.

Exploration holes have been drilled on the site, but no mining has been done.

The mining plan as submitted is conceptual and does not contain sufficient engineering details for final consideration of approval or disapproval under Federal Regulation 30 CFR 231. The following details are lacking at this time and will be required.

1. Plan should provide for analysis of any water encountered into the pit before discharging into drainageways.

2. Site locations and design of shop and sanitation facilities are not identified.

3. Electric power supply and transmission are not identified.

4. An evaluation of the more adequate machinery in size and payload to accomodate the mining and hauling phase. If completed, has not been addressed in the mining plan.

5. Only one cross-section showing dip of ore zones, thickness of ore zones, waste zones and overlying chert zones accompanies the plan for a 32000-foot pit. Exhibit 2 in the plan shows drill holes across other sections of the mineralized zone. These cross sections should accompany the plan.

6. The evaluation of a proposed development drilling program should be incorporated into the mining plan cross sections when completed. The plan is inadequate without these additional data.

The following is taken from the mine plan, prepared and submitted by Beker on March 25, 1974, for the proposed Champ mine. An environmental analysis, prepared by Beker and submitted to the U.S. Geological Survey on December 30, 1974, was utilized along with material obtained by interview.

A. PROPOSED MINING OPERATIONS

The plan proposes mining about 3.5 million tons of ore from two open pits (fig. 5-7). The smaller of the two pits, about 850 feet long, 250 feet wide, and 60 feet deep, has phosphate beds referred to as

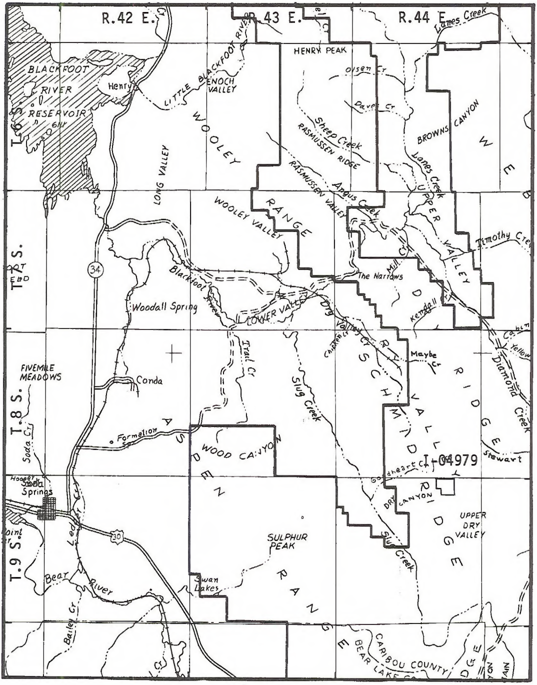

Figure 5-6.--Location of Federal phosphate lease for the proposed Champ mine.

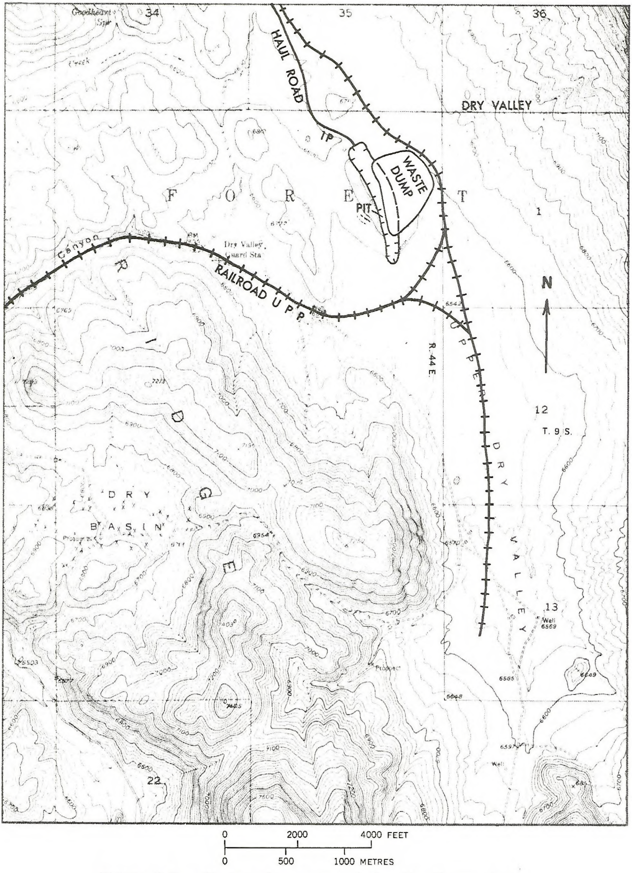

Figure 5-7.--Mining plan proposed for the Champ mine.

the "fault zone." The principal production will come from a primary pit about 3,100 feet long, 200 to 600 feet wide, and 260 feet deep, 800 feet west of the smaller pit.

The pit floor will follow the 12°-to-25°-dipping footwall, and the highwall will be benched and sloped 0.25:1 and 0.5:1. Equipment proposed includes scrapers in the range of 45 cubic yards per payload for waste removal and disposition, and front-end loaders in the range of at least 10 cubic yards per payload for ore removal. The hauling unit is planned to be in the range of at least 100 tons per payload. However, adequacy of machinery in size and payload is being further evaluated by Beker. The environmental analysis states that ore will be mined during the summer and that 70 percent of the waste will be removed during the winter. The Champ property contains two definite zones of phosphatic shale of commercial value. These will be mined simultaneously, and the ore will be blended to produce optimum mill feed. Both the upper and lower zones will be mined with a minimum cutoff of 15 percent P_2O_5. The ore above this cutoff point will be exposed by stripping. Beker states that there is no commercial timber on the leasehold, and that topsoil is too meager to stockpile separately from waste. The plan states that interbedded waste shale, when fertilized, promotes revegetation and that shale will form the exterior of the waste dumps.

The "fault-zone" phosphate ore will be mined first and the waste rock piled to the east at the valley-floor level (fig. 5-8). The primary pit will be mined next and the waste used to backfill the "fault-zone" pit and to cover the "fault-zone" pit waste dump. The primary pit will be partly backfilled along the limestone footwall. The time sequence for beginning and completion is not given in the plan, but corporation officials state that stripping will start in 1978, ore will be mined during 1979, and reclamation will be completed in 1980. Beker Industries has submitted for approval a development plan calling for the surface drilling of five holes to delineate the ore zones.

B. RECLAMATION

A waste dump will be placed immediately east of each pit. The dump will be compacted by the loaded scrapers. Dump faces, sloped at 2:1 and 3:1, will be graded to eliminate large rock, contoured to blend with the topography, fertilized, and seeded. Revegetation will be to Forest Service and U.S. Geological Survey specifications. Water from the waste-disposal face will be collected and directed along the sides and toe of the dump to be diverted onto the natural ground. Development drilling indicates little or no water to the depth of the present design limits. Should water be encountered, however, it will be pumped to settling basins and thence decanted to the nearest drainageway. Mine-plan maps show the slope of the primary pit floor to be inward to a central point. Here, ground water could form a lake.

Of the 321.25 total lease acres, 37 will be pit; 6 acres will be disturbed by various roadways, 45 acres by waste-disposal areas, and 4 acres by structure and facility construction. Approximately 75 acres will be rehabilitated.

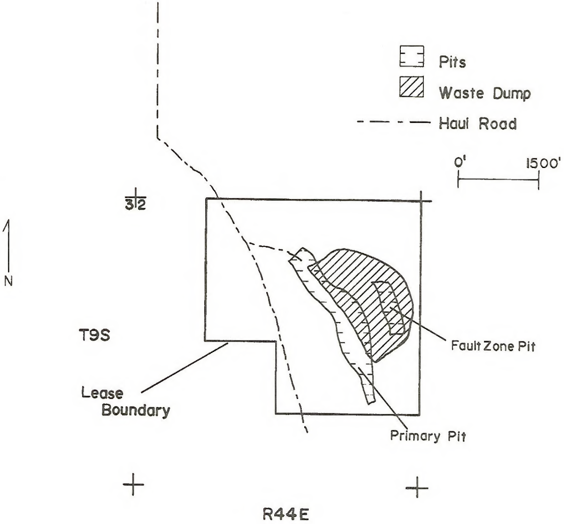

Figure 5-8.--Mining sequence proposed for the Champ mine.

C. SURFACE FACILITIES

Few structures are planned. A shop and necessary sanitation structures will be built. They will be removed and the area rehabilitated on conclusion of mining. Sanitation facilities will be located and constructed to specification and mutual agreement of Beker, the Forest Service, and the U.S. Geological Survey. All roads will be constructed to the specifications set forth in the mining plan for the pit area and the plans submitted to the Forest Service for the main haul road. In-pitroads will change during various phases of the mining, but permanent or long-lived roads would be built as specified in the mine plans. Electric power supply and transmission is not addressed in the plan.

A stock- and wildlife-watering system will be installed east of the proposed haul road. The water will be piped from Lonetree Springs.

The ore will be hauled 6 miles by private road in 100-ton units to the railroad tipple at Maybe Canyon, from where it will be shipped to the Beker fertilizer plant at Conda. The environmental analysis mentions the possibility of a rail terminal in South Dry Valley. An alternative proposed by the Union Pacific Railroad would extend the railway southward up Dry Valley, thence westward up Goodheart Canyon and northward down Slug Creek Canyon to the present railway. This alternative is discussed in part 3.

CHAPTER II
DESCRIPTION OF THE EXISTING ENVIRONMENT

A. NATURAL ENVIRONMENT

1. CLIMATE

The general climate of the area is described in Part 1. Temperatures at the site are likely about 4 degrees cooler than at Conda. According to the Idaho Bureau of Mines and Geology, annual precipitation at the Champ minesite is about 20 inches. Snow drifting, caused by the winds sweeping up Dry Valley from the northwest, is relatively small in extent. Much of the snow at this altitude, especially on the south slopes of the minesite, melts early in the spring. Snow problems are much less than on the easterly exposures.

2. LAND RESOURCES

a. Land Surface

The general topography of the site is shown on figure 5-7.

The minesite, about 6 miles southeast of the South Maybe Canyon site, is on a small hill roughly 300 feet high and nearly surrounded by valley sediment, near the west side of Upper Dry Valley. It is east of Dry Canyon which traverses Schmid Ridge.

b. Geology and Mineral Resources

The Meade Peak strikes about N. 25° W., dips 20°-30° S., and has small folds at the minesite. The Meade Peak is about 180 feet thick, and the total thickness of the lower and upper phosphate zones is 69 feet. The company plans to produce 3.5 million short tons of phosphate rock. Estimates of the total resources of some significant elements in the phosphate ore are: 84,000 short tons of fluorine, 380 short tons of uranium, 2,800 short tons of vanadium, and 3,500 short tons of rare earths.

c. Soils

The distribution of landtypes on the leasehold is shown in figure 5-9. Their characteristics are given in table 5-3. There are 150 acres of landtype 15 and 170 acres of landtype 53. Both have good topsoil that could be salvaged.

Landtype 15 is described in Part 4.1, Chapter II.

Landtype 53 occurs on all aspects of slopes. This landtype consists of moderately to strongly dissected scarp and dip slopes. The dip slopes, ranging from 400 to 1,200 feet, are somewhat longer than the scarp slopes. Soils are moderately deep to deep, fine, and loamy-skeletal. Soil depth varies from 3 to 5 feet on the scarp slopes, and from 5 to 7 feet on the dip slopes.

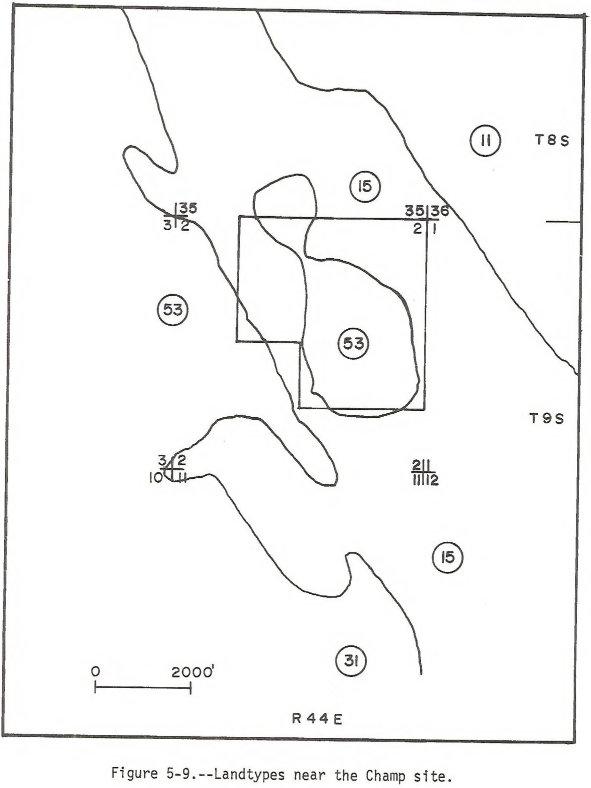

Figure 5-9.--Landtypes near the Champ site.

Table 5-3.--Physical characteristics of soils at Champ minesite. VL = very low, L = low, M = moderate, H = high, VH = very high

Landtype	Soil families	Percent of area	Erosion in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road Construction hazard	Slope range, in percent	Revegetation potential
				Depth in inches	Suitability					
15	Cryic Paleoborolls, fine-loamy, mixed	50	0.001	8	H	7.4	VL	L	1-5	VH
	Pachic Cryoborolls, loamy-skeletal, mixed	50	.001	12	H	4.3	VL	L	1-10	VH
53	Cryic Paleoborolls, fine-loamy, mixed	25	.007	10	H	7.4	M	M	25-45	VH
	Argic Cryoborolls, clayey-skeletal, montic	10	.005	8	L	6.2	M	M	30-50	H
	Pachic Cryoborolls, loamy-skeletal, mixed	45	.018	12	M	4.3	L	H	40-60	H
	Typic Cryorthents, loamy-skeletal, mixed	20	.007	6	M	5.2	L	M	40-50	M

3. WATER RESOURCES

a. Water Supply

1. Surface Water

Drainage from the minesite is by Dry Canyon and Goodheart Creek to Slug Creek. The stream in Dry Canyon is intermittent and carries water only during periods of snowmelt. Slug Creek, a tributary to the Blackfoot River, flows northward about 3 miles west of the mine. The disturbed areas could yield an average of about 100 to 200 acre-feet of water per year, depending on patterns of snow accumulation and the degree of revegetation and development.

2. Ground Water

The site contains little, if any, ground water at depths to be mined, although some small inconsequential perched ground-water bodies may exist.

b. Water Quality

No water-quality data are available for ground water or for Slug Creek. However, the quality of both are probably comparable with that for the Blackfoot River at the Forest Service station below the Narrows. Analyses of water samples for that site are listed below:

Low-flow conditions (August 20, 1974, to December 18, 1974)

Parameter	Number of determinations	Range	Average	Units
Discharge	13	80-123	108	cfs
Suspended sediment	13	0-36	4	ppm
Alkalinity as HCO_3	12	224-249	236	ppm
Total Kjeldahl nitrogen as N	12	0.9-2.2	1.4	ppm
Total phosphorus as P	13	0.00-0.05	.02	ppm
Hardness as $CaCO_3$	12	174-200	188	ppm
pH	2	7.3,7.4	--	pH units
Specific conductance	12	304-348	330	micromhos at 25°C

Total phosphate is low, considering the samples were unfiltered. Total Kjeldahl nitrogen, including ammonia and organic nitrogen, were significant (average 1.4 mg/l as N), probably reflecting the organic nitrogen compounds known to be present in the Phosphoria.

Data for the period January 21, 1975, to July 8, 1975, which include the spring snowmelt runoff, are also available:

Parameter	Number of determinations	Range	Average	Units
Discharge	20	78-1,170	328	cfs
Suspended sediment	27	0-141	40	ppm
Alkalinity as HCO_3	27	100-242	195	ppm
Total Kjeldahl nitrogen as N	27	1.2-3.2	2.1	ppm
Total phosphorus as P	25	0.10-0.29	.15	ppm
Total dissolved phosphorus as P	25	0.04-0.15	.11	ppm
Hardness as $CaCO_3$	27	98-306	174	ppm
pH	20	6.5-8.8	--	--
Specific conductance	27	281-565	377	micromhos at 25°C

The suspended-sediment concentrations are not unusually high, exceeding 100 ppm for only two measurements.

Trace constituents (total) in micrograms per litre (ug/l) are given below for two measurements on water from the Blackfoot River.

	August 26, 1974	May 13, 1975
Discharge (cfs)	110	208
Suspended sediment (ppm)	3	49
Arsenic (ug/l)	0	0
Cadmium (ug/l)	0	0
Chromium (ug/l)	1	6
Copper (ug/l)	9	4
Selenium (ug/l)	0	0
Vanadium (ug/l)	0	30
Zinc (ug/l)	2	5

4. AIR RESOURCES

In general, the air quality in the vicinity of the proposed minesite is good. Some dust and particulates also enter the air along roads in the vicinity as a result of vehicular traffic.

5. VEGETATION

Within the Champ lease, there are about 20 acres of conifer-aspen and 300 acres of sagebrush-grass.

Forage production ranges from 1,100 to 2,000 pounds per acre, air dry weight. No rare or endangered plants on the Smithsonian list have been identified nor are any known to exist on the leasehold.

6. WILDLIFE

Deer and elk utilize the area near the proposed Champ mine for cover when crossing Dry Valley; their numbers are minimal. Probably fewer than 10 deer and 5 elk use the leasehold. Sage grouse and blue grouse inhabit the area during spring, summer, and fall. The area is good nesting habitat for both species, but numbers of birds are small. Greater sandhill cranes and waterfowl utilize the wet meadow on the west side of the hill that will be mined; the meadow is considered suitable habitat for whooping cranes. The proposed haul road to the Maybe Canyon railhead will cross the meadow. The proposed haul road and all proposed alternative extensions of the railroad right-of-way from Maybe Canyon will also pass through an important elk wallow and a major elk calving ground for a distance of about 4 miles, starting south of Maybe Canyon and extending to within 1 mile or so north of the Champ minesite. (See Part 3 for the alternative rights-of-way.)

Wilson snipe, killdeer, meadowlark, mountain bluebird, vesper sparrow, and flicker are common on the site. Raptors include golden eagle, marsh hawk, red-tailed hawk, kestrel, short-eared owl, and long-eared owl. The limestone outcrops provide suitable habitat for marmot.

No threatened or endangered species have been observed on the leasehold.

7. FISHERIES

There are no significant fisheries on or near the leasehold. Streams on the leasehold are ephemeral.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

The Dry Valley Grazing Association is permitted to run 1,504 cattle from June 6 to September 30 on the Caribou National Forest. About 5,640 AUM's of forage, valued at $33,220, are consumed annually from the grazing allotment, which includes both the Champ and Mountain Fuel leases. The allotment, which includes the lease areas, is used in conjunction with the grazers' private and leased land and comprises a significant portion of the grazing operations. Cattle are moved onto the national-forest lands in a trailing operation. The acreage to be disturbed by mining on both sites is less than 2 percent of the total allotment.

2. SOCIOECONOMIC DEVELOPMENT

The site is primarily open range.

3. TRANSPORTATION AND UTILITIES SYSTEMS

Except for primitive drilling-access roads, no transportation or utilities systems are on the leasehold. The single-lane, unsurfaced Dry Valley road follows the west side of Dry Valley and parallels Dry Valley to the vicinity of the proposed mining operation. The road serves agricultural operations and limited recreation, stockman, and logging use. Heaviest use occurs during the hunting season. A single-lane, unsurfaced road extending northeast from the Slug Creek road through Dry Canyon provides alternative access to the site. This road serves very limited recreation, stockman, and logging use during the late spring, summer, and fall. Neither road receives programmed maintenance.

4. RECREATION RESOURCES

The area is popular for snowmobiling, ORV use and horseback riding. The deer, elk, and game birds of the area attract hunters. Although the site provides opportunity for primitive outdoor recreation experiences, use to date has been low.

5. ARCHEOLOGIC AND HISTORIC VALUES

In July, 1975, Professor B. Robert Butler, Associate Professor of Anthropology, Idaho State University, conducted an archeologic survey of the leasehold. No archeologic or historic materials were found, and an archeological clearance was recommended.

6. AESTHETICS

The variety class for the minesite is rated moderate. The site is in the middle-ground viewing zones of the Dry Valley and Slug Creek roads, which are secondary travel routes. The natural landscape has been disturbed by mineral exploration, but the results do not dominate the view at the present time.

CHAPTER III
ENVIRONMENTAL IMPACTS

Impacts, as described below, will be the same at either level of mining.

A. NATURAL ENVIRONMENT

1. LAND RESOURCES

a. Land Surface

The mine will create 37 acres of pits and 45 acres of waste dump. An additional 10 acres will be modified by roads and other facilities associated with the mining. Two open pits will be created. The larger pit will be about 3,100 feet long and 200 to 600 feet wide, and its 260-foot depth will be partially reduced by backfill. The smaller pit will be only about 5 acres in area and will be completely filled with waste rock from the other pit. Waste rock will amount to 10 million cubic yards. Waste dumps will be smoothed and have a low profile.

b. Geology and Mineral Resources

Mining will remove 3.5 million short tons of phosphate rock, which will include 84,000 short tons of fluorine, 380 short tons of uranium, 2,800 short tons of vanadium, and 3,500 short tons of rare earths. Only the phosphate resource will be utilized.

c. Soils

Mining will disturb soils on 92 acres; 45 acres of soils with high suitability for use as topsoil will be covered by the dump.

2. WATER RESOURCES

a. Water Supply

1. Surface Water

Evapotranspiration from disturbed surfaces will deplete moisture relatively rapidly because of the relatively low altitude and southerly exposure. Mining may increase the present channel scouring in Dry Canyon.

2. Ground Water

Proposed mining will probably have little impact on local or regional ground-water resources. One or more small, perched-water bodies could be intercepted with negligible impacts.

b. Water Quality

The impacts on overall water quality are similar to those described in Part 1.

The access road to the Champ mine will likely have little or no impact on streams in lower Dry Valley; estimated increases of 2 to 4 times the present very low sediment loads are expected in Goodheart Creek and Dry Canyon during mining, becoming low to very low, but declining to very low levels (less than twice the present loads) after mining. The expected increases in sediment in Dry Canyon will have no adverse effects on downstream reaches.

3. AIR RESOURCES

The proposed mine will have little effect on the air quality. Some dust and emissions from vehicles will result from the mining, especially during the dry season. Particulates entering the air from mining are estimated at 0.5 lbs/ton of ore mined. The local microclimate, such as patterns of snowdrifting, could change.

4. VEGETATION

Vegetation will be progressively removed from 92 acres, of which about 89 acres are sagebrush-grass, and 3 acres are conifer-aspen.

5. WILDLIFE

About 92 acres of wildlife habitat will be destroyed at the site. The minesite will be lost as a cover and resting area used by deer and elk that cross Dry Valley. Perhaps 10 deer and 5 elk will be lost from the leasehold.

The transportation system proposed for the mine will cause the displacement of elk that utilize the calving area and elk wallow in Dry Valley to other areas at or near capacity.

The excellent sage grouse and greater sandhill crane habitats, particularly in Upper Dry Valley, will be altered.

6. FISHERIES

No fisheries will be impacted near the Champ minesite.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Forage will be progressively removed from 92 acres of rangeland with an estimated average annual production of about 600 pounds of usable forage per acre, air dry weight. During the life of the mine, about 55 AUM's, valued at $325 annually, will probably be lost on the entire site; some additional forage may be lost on adjacent lands.

2. SOCIOECONOMIC DEVELOPMENT

The proposed mining operations of Beker will employ about 200 people. The social and economic impacts at the sites are minimal and by themselves are not significant. However, coupled with other proposed activities, they constitute in the aggregate significant socioeconomic impacts on a regional scale as described in Part 1.

3. TRANSPORTATION AND UTILITIES SYSTEMS

Mine traffic will compete with traffic on the Dry Valley or Dry Canyon road; the impact is likely to be low.

4. RECREATION RESOURCE

The proposed mining will have moderate impacts on hunting, snowmobiling, ORV use, and horseback riding on and near the site. Improved access to the area will greatly reduce the primitive and semi-primitive recreation opportunities.

5. ARCHEOLOGIC AND HISTORIC VALUES

There will be no known impacts.

6. AESTHETICS

Impacts will be moderate to high and will be exaggerated by their proximity to secondary travel routes.

CHAPTER IV
MITIGATING MEASURES

General mitigating measures that apply to the South Maybe Canyon, Champ, and Mountain Fuel proposals are discussed in part 5.1, chapter IV. These will be required.

The following proposal for mitigation of impacts is taken directly from Beker's mining plan for the Champ site.

At the Champ mine, the "fault-zone" pit will be completely backfilled, and the primary pit partly backfilled along the footwall. Dumps will be compacted and graded at 3:1 slopes to blend in with the topography and revegetated to USGS and Forest Service specifications. Water from the dump faces will be collected and directed along the sides and toe of the dump and diverted onto natural ground. If water is encountered in the pit, it will be pumped to settling basins and thence decanted to the nearest drainageway. A stock- and wildlife-watering system will be installed east of the proposed haul road. These proposals conform in part to required mitigation.

A further site-specific mitigating measure that should be required at the Champ site is that observation wells be installed to monitor both ground-water levels and water quality in the alluvium along Dry Valley Creek near the pit.

The topsoil on the proposed dump site should be salvaged for use in reclamation.

CHAPTER V
ADVERSE EFFECTS THAT CANNOT BE AVOIDED

At either level of mining, changes in land surface configuration are unavoidable (fig. 5-10); 17 acres will not be reclaimed.

Disturbance of natural soils on 92 acres at the Champ mine cannot be avoided.

Some minor increases in sediment loads ranging from low to very low both during and subsequent to mining cannot be avoided.

Some dust and emissions from vehicles during the mining operations are unavoidable.

Vegetation will ultimately be removed from 92 acres, with a maximum of 70 acres cleared at any one time during the life of the mine. Annual forage production of 75 acres of reclaimed land will probably not exceed 550 to 1,000 pounds per acre, air dry weight--about half the present value. Production on 17 unreclaimed acres will be lost.

Loss of perhaps 10 deer, 5 elk, and similar amounts of other wildlife displaced from 92 acres of habitat cannot be avoided. Some alteration of sandhill crane and year-round grouse habitat is also unavoidable.

Forage will ultimately be removed from 92 acres of rangeland. Average annual production of usable forage on 75 acres of reclaimed land will probably not exceed 300 pounds per acre, air dry weight; forage on 17 unreclaimed acres will be almost totally lost.

Impacts on transportation will be low, on recreation moderate. Impacts on aesthetics will be moderate to high.

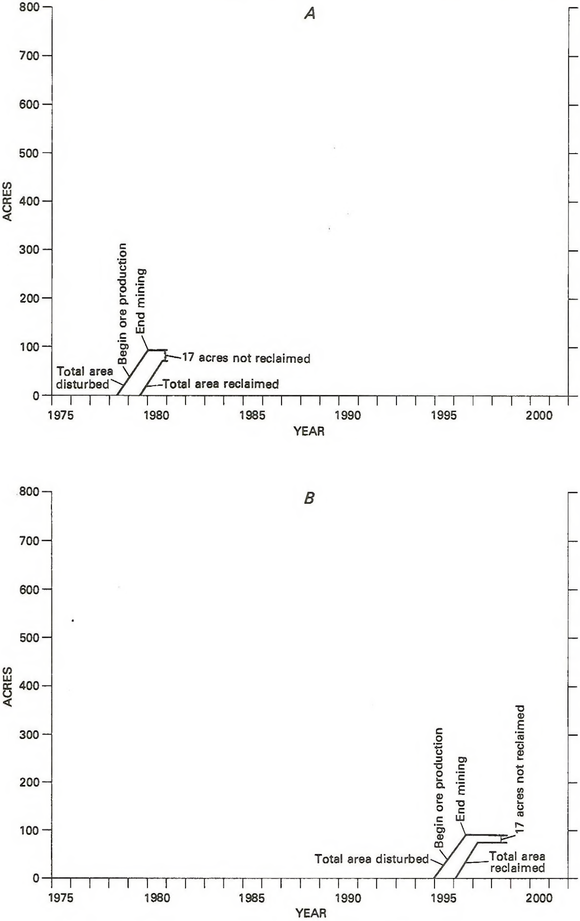

Figure 5–10.—Land disturbance and reclamation, Champ site. *A*, Based on mining plan as submitted for approval. *B*, Based on revised level of mining.

CHAPTER VI
SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

About 3.5 million short tons of phosphate rock will be removed for processing into fertilizer at Conda. In so doing, soils will be disturbed on about 92 acres, and about 10 million cubic yards of overburden and bedrock will be moved.

There will be some limited short-term lowering of water quality from minor increases in runoff and sediment. There will also be some short-term lowering of air quality resulting from dust and vehicular emissions associated with the mining. The mining activities will significantly lower the aesthetic quality and recreation resources during operations.

During mining, vegetation will be progressively removed from 92 acres; forage production of 1,100 to 2,000 pounds per acre, air dry weight, will be lost on a maximum of 70 acres at any given time. Limited numbers of wildlife will be displaced to adjacent ranges. As few as 10 deer and 5 elk may be affected. On the minesite, about 55 AUM's of forage, valued at $325 annually, will be lost during mining, because most of the site will not be available for grazing.

Long-term productivity of the area will be decreased. Annual forage production on 75 acres of reclaimed land will probably not exceed 550 to 1,000 pounds per acre, air dry weight--about half the present value. Production on 17 unreclaimed acres will be lost. There will be some long-term effect on wildlife in the area as a result of competition on adjacent ranges from animals displaced from the area, but the effect should be small. Average annual production of usable forage on 75 reclaimed acres will probably not exceed 300 pounds per acre, air dry weight. Production on unreclaimed acres will be virtually zero. On the entire site, average production of usable forage of about 33 AUM's, valued at $195, will be lost annually. The loss of remoteness and related recreational resources as a result of new or improved access to the area will also be long term.

CHAPTER VII
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

About 3.5 million short tons will be mined and processed. This is irretrievable. This ore contains 84,000 short tons of fluorine, 2,800 short tons of vanadium, 380 short tons of uranium, and 3,500 short tons of rare earths, which will be removed but not recovered. The landscape changes created by pits and dumps are largely irreversible. Reduction of vegetative productivity on about 92 acres with attendant reduction in forage is irreversible. Loss of some wildlife, to the extent that it cannot relocate successfully, is irretrievable; the consequent loss of hunting and nature study opportunities is also irretrievable. The remote, undeveloped character of the area will be irreversibly and irretrievably committed to the intrusion of mining-related changes.

The mining and reclamation of disturbed areas will require about 1.8 million gallons of diesel fuel, 140,000 gallons of gasoline, as well as unknown amounts of lubricants and explosives. Minor amounts of construction materials will be required for service facilities; these materials will be lost to other uses.

Transportation of the ore from the mine to the processing plant at Conda will require 390,000 gallons of diesel fuel.

Beneficiation of the ore will require about 27 million kilowatt-hours of electricity, about 11 billion cubic feet of natural gas, about 14,000 gallons of gasoline, and about 48,000 acre-feet of water. Converting the calcined rock to fertilizer will require about 310 million kilowatt-hours of electricity, 14,000 gallons of gasoline, and 3.2 million tons of sulfuric acid. These resources will be lost to other uses.

CHAPTER VIII
ALTERNATIVES

Alternatives that apply to the South Maybe Canyon, Champ, and Mountain Fuel proposals are discussed in Part 5.1, Chapter VIII.

The following alternatives apply specifically to the Champ proposal.

Beker proposes to haul ore 6 miles over private road in 100-ton truck units to the railroad at Maybe Canyon. The proposed extension of the Dry Valley rail spur would probably have impacts similar to those of the haul road. The Champ site is within a mile of the proposed railroad; scrapers could probably haul directly from pit to railroad tipple, and alternative transportation systems would probably have greater impacts. If the proposed railroad serves other mines, it will have less impact than separate haul roads. The alternative of restricting access to the rail route through Dry Canyon would eliminate impacts on the elk calving ground that would be crossed by access routes directly from the Maybe Canyon mine.

Beker proposes partial backfilling of the pits; the alternative of placing all wastes in the pits would eliminate the dump. Elimination of the dump would preserve productivity on 45 acres with consequent reduction of impacts on wildlife, aesthetics, and livestock grazing. This alternative would, however, still require dumping outside the pit.

PART 5.3
MOUNTAIN FUEL MINING PLAN

CHAPTER I
DESCRIPTION OF THE PROPOSED ACTION

The proposed project is approximately 8 miles south of Beker's presently operating phosphate mine at Maybe Canyon and 2 miles south of their proposed Champ mine in Upper Dry Valley. It is in the north half of Federal phosphate lease I-012989 (fig. 5-11). This lease covers 560 acres within the Caribou National Forest.

During the spring of 1967, Mountain Fuel Supply Company, the former lessee, began developing an open-pit mine in the leasehold at the same site proposed in this plan. At that time, about 1 million tons of overburden was stripped and used to construct a haul road from the pit to the lease boundary. About a mile of road fill was placed before the project was terminated. No ore was mined, but development drilling and trenching have been done.

Concurrent with the filing of this mining plan Beker also filed a request with the USGS for approval of a drilling program designed to investigate mineralization at depth and fill in gaps left by earlier drilling. Until this exploration is accomplished and the data incorporated in the pending mining plan, the plan is inadequate in ore reserve estimates, geologic structure interpretation, and ore cut-off grade and cannot be considered for final approval or disapproval under Federal Regulation 30 CFR 231. The following details are lacking at this time and will be required.

1. Sequence of mining and pit expansion throughout the mining must be discussed.

2. The stockpiling of topsoil is not discussed.

3. Design and location of mine support surface facilities are not identified.

The following information is taken from the mining plan submitted by Beker on December 23, 1974, to the Conservation Division, U.S. Geological Survey, in accordance with 30 CFR 231.10. Information contained in an environmental analysis prepared by Beker and submitted to the U.S. Geological Survey on December 30, 1974, was also utilized along with information obtained for interviews with Beker officials.

A. PROPOSED MINING OPERATIONS

Beker has indicated that mining will probably begin in 1980; about 10 million tons of ore will be mined from 1980 to 1982 and reclamation will be completed in 1983. The mining plan states that the property contains two definite ore zones, which will be mined simultaneously from an open pit, which will have an average depth of 250 feet (fig. 5-12). The plan does not stipulate sequence of mining, but the location of the

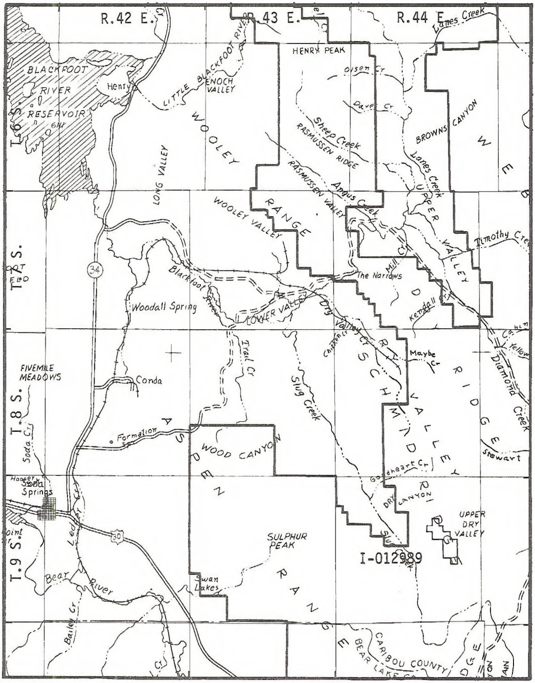

Figure 5-11.--Location of Federal phosphate lease for the proposed Mountain Fuel mine.

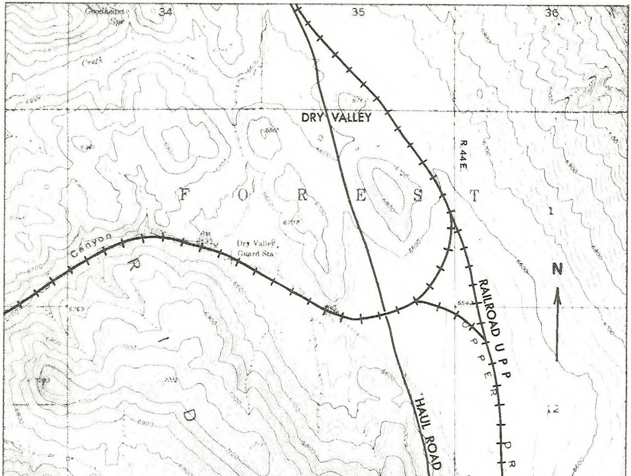

Figure 5-12.--Mining plan proposed for the Mountain Fuel site.

waste dump at the south end of the pit indicates mining from south to north (fig. 5-13). Mining, at a stripping ratio of 1.5 cubic yards of waste to 1 ton of ore, will be done with front-end loaders and 50-ton haul units for delivery either to the present rail facility at Maybe Canyon or a loading facility near the mine. Ore will be removed during the summer, and stripping will be confined mostly to the winter, using 45-cubic-yard scrapers or shovel-truck units. Selective mining will provide a 15 percent P_2O_5 cutoff grade. There is no provision for stockpiling phosphate rock of marginal grade.

Alluvium and soil, which overlie the phosphatic beds, are of good quality but are thin. The company proposes to stockpile only selected areas of the thicker soil; the plan does not discuss stockpiling sites or protection from erosion.

The environmental analysis states that ore will be mined during the summer, and waste rock removed during the winter.

Beker has submitted a exploration development plan calling for drilling 25 deep holes and 40 shallow holes from surface locations. This drilling program, originally scheduled for spring of 1975, has not as yet been started (January 1976).

B. RECLAMATION

Most of the waste rock will be disposed of by backfilling mined areas. A minimum will be piled to the south outside the mined area to begin operations (fig. 5-13).

Waste will be compacted in dumps by the mining machinery. The faces of the dump will be left smooth, sloped 3:1, and shaped to the configuration set forth in the mining plan. The toe of all disposal areas will be shaped to blend with the natural topography. All tops and slopes on the disposal areas will be revegetated to Forest Service and U.S. Geological Survey specifications. Water from the waste-disposal face will be collected by terracing, led along the sides and toe of the dump, and diverted on the natural ground. All runoff water will be delivered into noneroding conveyances and spread onto the natural ground by energy-dissipating devices. Final specifications and location of these devices will be determined by Beker with concurrence of the Forest Service and the U.S. Geological Survey prior to construction. Brush barriers will be placed at the toe of waste dumps where feasible to impede siltation and erosion.

Beker states that its experience in Maybe Canyon indicates that proper placing of interbedded shale sections along with fertilizer, if seeded properly with the correct grasses and legumes, provides vegetation that may be better than the original. Beker proposes to stockpile topsoil only where it is relatively thick; large areas will be revegetated with middle-waste-shale section. Revegetation data from former Maybe Canyon disposal areas according to Beker can be applied to this operation. The environmental analysis reports merchantable timber

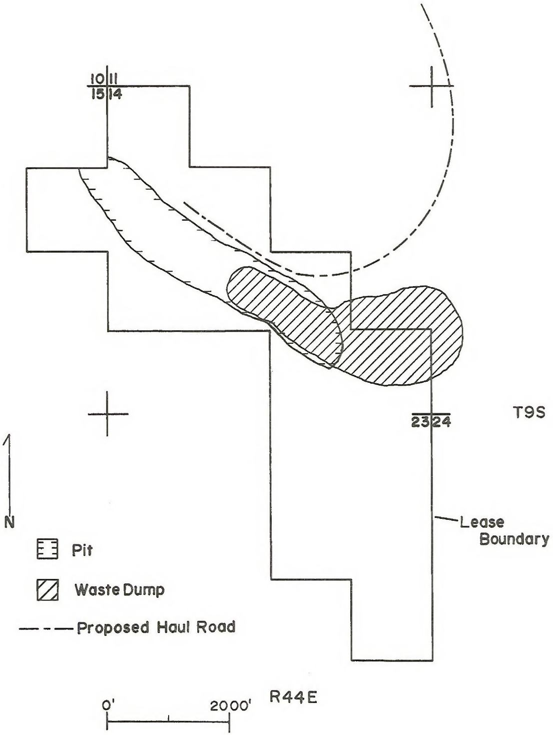

Figure 5-13.--Mining sequence proposed for the Mountain Fuel mine.

in the leasehold and that it will be evaluated. All grasses and legumes will be planted to Forest Service and U.S. Geological Survey specifications at the same mixture as proposed for the South Maybe Canyon mine (Part 5.1, Chapter I).

Of the 560 total acres in this property, there will be about 68 acres of pit 96 acres of dump, and 5 acres of roads. Approximately 155 acres will be rehabilitated.

C. SURFACE FACILITIES

A small shop and shop area may be constructed. An office, lunch area, and necessary sanitation structures will probably be built at the east end of the property.

In-pit roads will be changed during various phases of mining, but permanent roads will be constructed as specified in the mine plan. Beker, in early 1974, submitted for approval a proposal for a private 8-mile haul road from the mining site to the present railhead at Maybe Canyon. If additional mine operators enter the near area, Beker is prepared to assist in planning or negotiations for extending the railroad southward from Maybe Canyon up Dry Valley. (See Part 3.)

CHAPTER II
DESCRIPTION OF THE EXISTING ENVIRONMENT

A. NATURAL ENVIRONMENT

1. CLIMATE

Temperatures at the site are likely about 4 degrees cooler than at Conda. The northeast exposure further reduces daytime temperatures. According to the Idaho Bureau of Mines and Geology, annual precipitation averages about 25 inches. Snow drifting is caused by the winds sweeping up Dry Valley from the northwest, but the extent and pattern are not known. Even though the elevation is relatively low, the northeast exposure will delay snowmelt.

2. LAND RESOURCES

a. Land Surface

The general topography of the site is shown on figure 5-12.

The Mountain Fuel site is on the east side of Schmid Ridge, near its south edge. The mine area has several hundred feet of relief, its highest point being about 600 feet above the floor of Dry Valley.

b. Geology and Mineral Resources

At the minesite, the Meade Peak strikes variably northwest and dips 20° to 30° northeast. It is about 195 feet thick, and the total thickness of the lower and upper phosphate zones is about 70 feet. Small folds and faults are common. The company plans to produce 10 million short tons of phosphate rock. Estimates of the total resources of some significant elements in the phosphate ore are: 240,000 short tons of fluorine, 1,100 short tons of uranium, 8,000 short tons of vanadium, and 10,000 short tons of rare earths.

c. Soils

The distribution of landtypes on the leasehold is shown in figure 5-14. Their characteristics are given in table 5-3. There are 85 acres of landtype 15, 200 acres of landtype 31, 70 acres of landtype 41, and 205 acres of landtype 53. Landtype 15 is described in Part 4.1, the remaining landtypes in Part 5.1. Landtype 15 has good topsoil.

3. WATER RESOURCES

a. Water Supply

1. Surface Water

The minesite drains mostly into Upper Dry Valley but a small part drains through Dry Basin to Slug Creek. Runoff is minimal; the streams from the site are ephemeral. The disturbed areas could yield an average of 200 to 300 acre-feet of water per year.

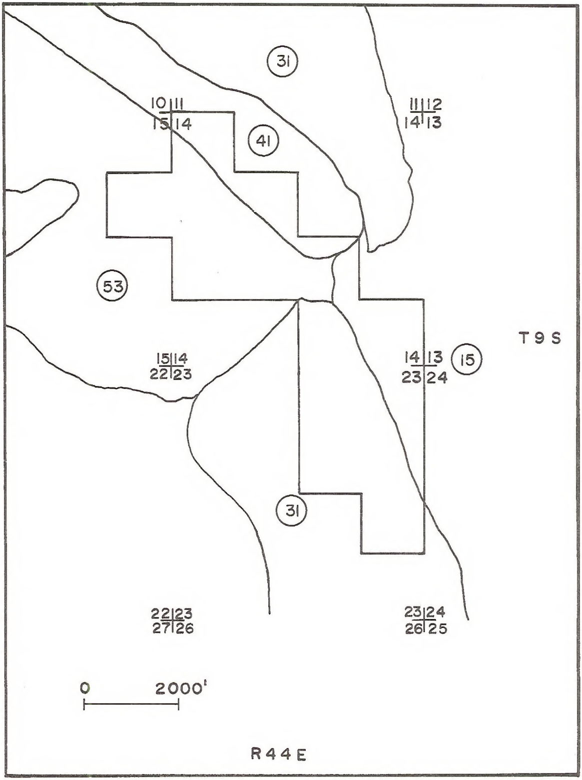

Figure 5-14.--Landtypes near the Mountain Fuel site.

Table 5-4.--Physical characteristics of soils at Mountain Fuel minesite. VL = very low, L = low, M = moderate, H = high, VH = very high

Land-type	Soil families	Percent of area	Erosion in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road Construction hazards	Slope range, in percent	Revegetation potential
				Depth in inches	Suitability					
15	Cryic Paleoborolls, fine-loamy, mixed	50	0.001	8	H	7.4	VL	L	1-5	VH
	Pachic Cryoborolls, loamy-skeletal, mixed	50	.001	12	H	4.3	VL	L	1-10	VH
31	Mollic Cryoboralfs, loamy-skeletal, mixed	70	.021	6	L	8.8	L	M	35-50	M
	Typic Cryoborolls, fine-loamy, mixed	10	.005	8	M	7.0	L	M	30-45	M
	Typic Cryoborolls, loamy-skeletal, mixed	20	.009	8	M	4.5	VL	L	20-25	L
41	Calcic Pachic Cryoborolls, loamy-skeletal, mixed	55	.075	10	M	3.9	L	H	30-70	VL
	Argic Pachic Cryoborolls, loamy-skeletal, mixed	20	.032	10	H	5.7	L	H	20-50	L
	Lithic Cryoborolls, loamy-skeletal, mixed	15	.023	4	L	3.4	VL	M	20-30	VL
	Argic Cryoborolls, loamy-skeletal, mixed	10	.045	8	L	4.5	L	H	40-60	L

Table 5-4.--Physical characteristics of soils at Mountain Fuel minesite--Continued

Land-type	Soil families	Percent of area	Erosion, in inches per year	Topsoil potential		Avail-able water capacity	Mass fail-ure hazard	Road Construc-tion hazards	Slope range, in percent	Revege-tation poten-tial
				Depth, in inches	Suit-ability					
53	Cryic Paleoborolls, fine-loamy, mixed	25	0.007	10	H	7.4	M	M	25-45	VH
	Argic Cyoborolls, clayey-skeletal, montic	10	.005	8	L	6.2	M	M	30-50	H
	Pachic Cryoborolls, loamy-skeletal, mixed	45	.018	12	M	4.3	L	H	40-60	H
	Typic Cryorthents, loamy-skeletal, mixed	20	.007	6	M	5.2	L	M	40-50	M

Nearby stream channels usually carry water only during periods of snowmelt.

2. Ground Water

The site contains little, if any, ground water at depths to be mined, although some small inconsequential perched ground-water bodies may exist.

b. Water Quality

Water-quality data are not available from the Mountain Fuel site, but water quality is probably like that of other small streams sampled in the area. Data for the Forest Service site on Diamond Creek above the confluence with Stewart Creek, about 5 miles northeast of the proposed minesite, is characteristic. Selected parameters are shown below. Water samples were collected from August 19 to September 3, 1974, (low-flow conditions), and from May 21 to July 9, 1975 (snowmelt).

PARAMETERS	RANGE IN VALUES LOW FLOW	INCLUDES SPRING RUNOFF
Number of measurements	3	11
Instantaneous discharge (cfs)	0.2-0.7	See below
Hardness as $CaCO_3$ (ppm)	168-170	114-162
Total Kjeldahl nitrogen as N (ppm)	2.7-2.8	1.4-2.5
Total phosphate as P (ppm)	0.08-0.14	0.07-0.17
Suspended sediment (ppm)	1-6	2-126

Discharge data from four measurements during spring runoff and the corresponding sediment concentrations were as follows:

DATE	DISCHARGE (cfs)	SUSPENDED SEDIMENT (ppm)
May 28, 1975	8.0	18
June 10, 1975	45	84
June 17, 1975	50	80
July 02, 1975	22	66

Two samples were analyzed for selected trace elements. Results in micrograms per litre are shown below.

	August 26, 1974. (Discharge 0.4 cfs; sediment 2 ppm.)	May 28, 1975. (Discharge 8 cfs; sediment 18 ppm.)
Arsenic	0 1/	0
Cadmium	0	0
Chromium	2	3
Copper	5	4
Selenium	0	10
Vanadium	0	31
Zinc	2	29

1/ Concentrations recorded as 0 are less than detectable amounts.

4. AIR RESOURCES

In general, the air quality in the vicinity of the proposed minesite is good. Some dust and particulates also enter the air along roads in the vicinity as a result of vehicular traffic.

5. VEGETATION

Conifer-aspen covers 367 acres and sagebrush-grass covers 193 acres on the lease. Forage production ranges from 800 to 2,000 pounds per acre, air dry weight.

No rare or endangered plants on the Smithsonian list have been identified nor are any known to exist on the leasehold.

6. WILDLIFE

Greater sandhill cranes and waterfowl utilize a wet meadow that will be crossed by the proposed haul road to the Maybe Canyon railhead. The proposed haul road and all proposed alternative extensions of the railroad right-of-way from Maybe Canyon will also pass through an important elk wallow and a major elk calving ground for a distance of about 4 miles, starting south of Maybe Canyon and extending to within 1 mile or so north of the Champ minesite. (See Part 3 for the alternative rights-of-way.)

The area near the minesite provides good habitat for wildlife. Deer, elk, and moose are commonly observed; black bear, occasionally. As many as 30 deer, 30 elk, and perhaps less than 5 moose use the area. The excellent habitat has helped create significant populations of sage, blue, and ruffed grouse. Considerable effort has been made to coordinate livestock grazing with habitat needs of sage grouse. A range-improvement project in the valley bottom has enhanced this sage grouse habitat, which is used mainly during late summer and fall. The area has been a choice hunting area for sage grouse for several years.

Dry Valley within 1 mile east of Mountain Fuel site provides habitat for greater sandhill cranes, and habitat considered suitable also for whooping cranes.

Badger, coyote, bobcat, skunk, weasel, and porcupine are commonly observed near the site. Birds of prey include the golden eagle, goshawk, turkey vulture, red-tailed hawk, great horned owl, and kestrel.

No threatened or endangered species have been observed on the leasehold.

7. FISHERIES

There are no significant fisheries on or near the minesite. Streams on the leasehold are ephemeral.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

The nearest agriculture consists mainly of dryland small-grain crops and meadow pastures at the upper end of Slug Creek, 2.5 miles to the west.

The Dry Valley Grazing Association uses both the Mountain Fuel and Champ sites. Their operation is discussed in Part 5.2.

2. SOCIOECONOMIC DEVELOPMENT

The site is primarily open range.

3. TRANSPORTATION AND UTILITIES SYSTEMS

A single-lane access road extends from the Slug Creek road at the mouth of Dry Canyon southeastward through Dry Basin to the minesite. The road continues on about 1 mile to the Dry Valley road in Upper Dry Valley. The single-lane road in Dry Valley provides access to the site from Dry Valley. These roads receive heaviest use during the hunting season.

In 1967 Mountain Fuel Supply Company built about 1 mile of haul road from the pit to the lease boundary. The road was subsequently seeded and cross-ditched.

No utility systems are on the leasehold.

4. RECREATION RESOURCES

The number of visitors to the site is low. Hunting and snowmobiling are the dominant recreation uses; others include ORV use and horseback riding. Visitors generally stay less than one day, and autumn is the most popular season for use.

No facilities have been developed primarily for recreation, so uses have conformed to the utility roads and more moderate areas of terrain.

The site does not lend itself to destination-type development. Mineral exploration has eliminated the primitive quality of the area and made the landscape appear less remote but travel to the site still takes considerable effort.

5. ARCHEOLOGIC AND HISTORIC VALUES

The leasehold includes no registered historic sites. In July, 1975, Professor B. Robert Butler, Associate Professor of Anthropology, Idaho State University, conducted an archeologic survey of the leasehold. No archeologic or historic materials were found, and an archeological clearance was recommended.

6. AESTHETICS

Visitors are attracted to the site by its seclusion, open space, and an environment removed from most human influences, even though the variety class for the area is rated moderate to low, and mineral exploration has reduced its aesthetic quality. Access is available by utility routes from the Slug Creek road, which is a secondary travel route that provides access for many uses, including recreation. Most recreation use is in the fall, when the golden color of the aspen enhances the experience.

The open character of the area heightens visibility of land scars, and the site is in the immediate middle-ground viewing zone of the Slug Creek road.

CHAPTER III
ENVIRONMENTAL IMPACTS

The impacts from mining, either as proposed or based upon a more probable level of mining as shown in table $1\text{-}1_a$, will be the same.

A. NATURAL ENVIRONMENT

1. LAND RESOURCES

a. Land Surface

The proposed Mountain Fuel mine will create 68 acres of pit and 96 acres of waste dumps. An additional 5 acres will be modified by roads and other facilities associated with the mining. The open pit will be 4,700 feet long, 200 to 1,000 feet wide and 100 to 325 feet deep. Proposed backfilling will reduce the depth of the pit. Waste rock will total 30 million cubic yards. Waste dumps will be smoothed and have a low profile.

b. Geology and Mineral Resources

Mining will remove 10 million short tons of phosphate rock, which will include 240,000 short tons of fluorine, 8,000 short tons of vanadium, 1,100 short tons of uranium, and 10,000 short tons of rare earths. Only the phosphate resource will be utilized.

c. Soils

Mining will disturb soils on 169 acres, at the rate of about 70 acres per year.

2. WATER RESOURCES

a. Water Supply

1. Surface Water

Disturbed surfaces will retain soil moisture relatively well because of the northeasterly exposure, which may enhance revegetation potential. Mining may increase the scouring in Dry Canyon. Extent of these impacts cannot be quantified from available data.

2. Ground Water

Proposed mining will have little impact on local or regional ground-water resources. One or more small, perched-water bodies could be intercepted with negligible impacts.

b. Water Quality

Access roads to the Mountain Fuel mine will probably have a negligible effect on sediment in Goodheart Creek. Mining will likely increase sediment 3 to 6 times present loads in Dry Basin Creek during mining and 2 to 4 times after mining; the present very low sediment loads will become low during mining and very low after mining. The increased sediment loads in Upper Dry Valley are estimated at 2 to 4 times present loads during mining and less than 2 times following mining; the present very low loads will become low to very low during mining and decline to very low afterward. The estimated increases in sediment will have a negligible effect downstream in Dry Canyon and Slug Creek.

Cumulative downstream effects of estimated increases from several mines are described in Part 1.

3. AIR RESOURCES

The proposed mine will have little effect on the air quality. Some dust and emissions from vehicles will result from the mining, especially during the dry season. Particulates entering the air from mining are estimated at 0.5 lbs/ton of ore mined. The local microclimate, such as patterns of snowdrifting, could change.

4. VEGETATION

Vegetation will be progressively removed from 169 acres, of which about 145 acres are conifer-aspen, and 25 acres are sagebrush-grass. Over 50 acres of conifer timber will be removed.

5. WILDLIFE

About 169 acres of wildlife habitat will be lost at the site.

The transportation system proposed for the mine will cause displacement of elk that utilize the calving area and elk wallow in Dry Valley. As many as 30 deer, 30 elk, and 5 moose will be lost due to the mining. Nesting trees used by a few great horned owl and goshawk will be removed.

Effects on the presently excellent sage grouse and greater sandhill crane habitats, particularly in Upper Dry Valley, will be significant, especially to the sage grouse populations in the area.

6. FISHERIES

No fisheries will be impacted by the mining.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Forage will be progressively removed from 169 acres of rangeland with an estimated average annual production of about 400 pounds of usable forage per acre, air dry weight. During the life of the mine, about 95 AUM's, valued at $570 annually, will probably be lost on the entire site; some additional forage may be lost on adjacent lands.

2. SOCIOECONOMIC DEVELOPMENT

The proposed mine will employ about 200 people. The social and economic impacts at the site are minimal and by themselves are not significant. However, coupled with other proposed activities, they constitute in the aggregate significant socioeconomic impacts on a regional scale as described in Part 1.

3. TRANSPORTATION AND UTILITIES SYSTEMS

The proposed mining will restrict traffic on Dry Valley road and Slug Creek-Dry Valley road. Traffic will be stopped on Dry Valley road when ore trucks cross on the haul road. Access between Slug Creek and Dry Valley by way of the Slug Creek-Dry Valley road will be blocked. These impacts will be generally low.

4. RECREATION RESOURCES

The proposed mine will have moderate impacts on hunting, snowmobiling, horseback riding, and ORV use.

5. ARCHEOLOGIC AND HISTORIC VALUES

There will be no known impacts.

6. AESTHETICS

Impacts will be moderate to high because of the proximity of the site to the Slug Creek road, a secondary travel route. Removal of the aspen will reduce the visual variety of the area. Development of haul roads, transportation systems, and utilities will result in visual conflicts with the aesthetic character of the area.

CHAPTER IV
MITIGATING MEASURES

General mitigating measures that apply to the South Maybe Canyon, Champ, and Mountain Fuel proposals are discussed in part 5.1, chapter IV. These measures will be required at this minesite.

The following proposal for mitigation of impacts is taken directly from Beker's mining plan for the Mountain Fuel site.

Some topsoil will be stockpiled for use in reclamation. Most waste rock will be backfilled. The dump will be graded at 3:1 slope to blend in with the topography, and will be revegetated to USGS and Forest Service specifications. Water from the dump face will be collected by terracing and diverted on natural ground, where brush barriers will be placed to impede erosion and siltation.

These proposals conform in part to required mitigation of impacts.

To the maximum extent feasible, topsoil from disturbed areas shall be stockpiled for use in reclamation.

CHAPTER V
ADVERSE EFFECTS THAT CANNOT BE AVOIDED

Changes in land surface configuration are unavoidable (fig. 5-15); 14 acres will not be reclaimed.

Disturbance of natural soils on 169 acres cannot be avoided.

Vegetation will ultimately be removed from 169 acres, with about 80 acres cleared at any one time during most of the life of the mine. More than 50 acres of conifer timber will be removed. Annual forage production on 155 acres of reclaimed land will probably not exceed 400 to 1,000 pounds per acre, air dry weight--about half the present value. Production on 14 unreclaimed acres will be lost.

Some dust and emissions from vehicles during the mining operations are unavoidable.

Loss of as many as 30 deer, 30 elk, 5 moose, and unknown similar numbers of other animals from 169 acres cannot be avoided. Loss of an unquantified amount of sandhill crane and year-round grouse habitat with consequent displacement of birds, is also unavoidable.

Forage will ultimately be removed from 169 acres of rangeland. Average annual production of usable forage on 155 acres of reclaimed land will probably not exceed 200 pounds per acre, air dry weight; forage on 14 unreclaimed acres will be almost totally lost.

Impacts on transportation will be low, on recreation moderate. Impacts on archeologic sites cannot be assessed until a survey, as required under Executive Order 11593, is completed. Impacts on aesthetics will be moderate to high.

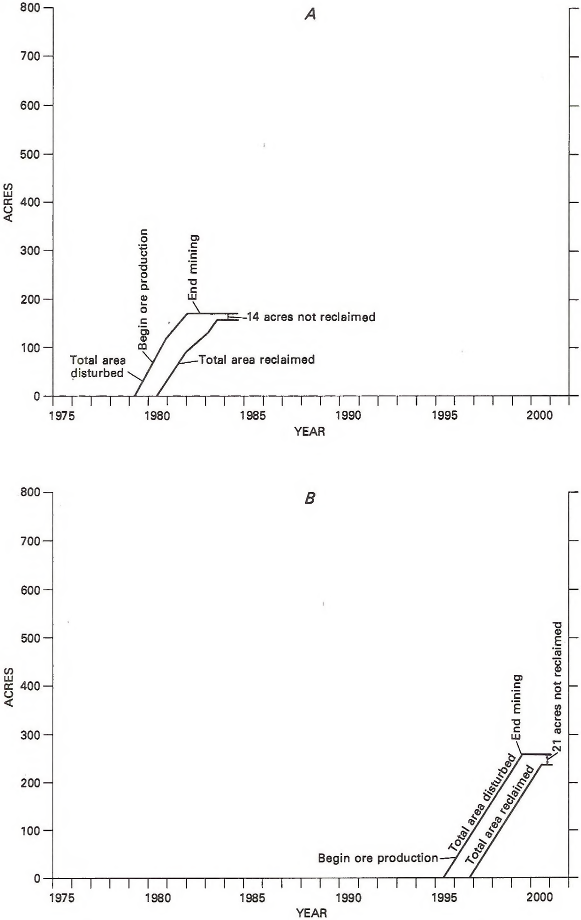

Figure 5-15.—Land disturbance and reclamation, Mountain Fuel site. *A*, Based on mining plan as submitted for approval. *B*, Based on revised level of mining.

CHAPTER VI
SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

Mining will remove 10 million short tons of phosphate rock for processing into fertilizer at Conda. In so doing, soils will be disturbed on 169 acres, and about 30 million cubic yards of overburden and bedrock will be moved.

There will be a very slight increase in runoff and sediment. There will also be some short-term lowering of air quality resulting from dust and vehicular emissions associated with the mining. The mining activities will severely lower the aesthetic quality and recreation resources during operations.

During mining, vegetation will be progressively removed from 169 acres; forage production of 800 to 2,000 pounds per acre, air dry weight, will be lost on about 80 acres at any given time. Wildlife will be displaced to adjacent ranges in competition with existing herds. As many as 30 deer, 30 elk, 5 moose, and unknown similar numbers of other animals may be affected. On the minesite, about 95 AUM's of forage, valued at $570 annually, will be lost during mining, because most of the site will not be available for grazing.

Long-term vegetative productivity of the area will be decreased. Although partial backfilling of pits is planned, it is not likely that vegetation on disturbed areas will recover to premining levels. Annual forage production on 155 acres of reclaimed land will probably not exceed 400 to 1,000 pounds per acre, air dry weight--about half the present value. Production on 14 unreclaimed acres will be lost.

There will be some long-term effect on wildlife in the area as a result of competition on adjacent ranges from animals displaced from the area. Average annual production of usable forage on 155 reclaimed acres will probably not exceed 200 pounds per acre, air dry weight. Production on 14 unreclaimed acres will be virtually zero. On the entire site, average production of usable forage of about 50 AUM's, valued at $295, will be lost annually. The loss of remoteness as a result of new or improved access to the area will also be long term, as will reduction of the recreation and aesthetic resources.

CHAPTER VII
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

About 10 million short tons will be mined and processed. This is irretrievable. This ore also contains 240,000 short tons of fluorine, 8,000 short tons of vanadium, 1,100 short tons of uranium, and 10,000 short tons of rare earths, which will be removed but not recovered. The landscape changes created by pits and dumps are largely irreversible. Reduction of productivity on about 169 acres with attendant reduction in forage is irreversible. Loss of some wildlife, to the extent that it cannot relocate successfully, is irretrievable, as is the consequent loss of hunting and nature study opportunities. The remote, undeveloped character of the area will be irreversibly and irretrievably committed to the intrusion of mining-related changes.

The mining and reclamation of disturbed areas will require about 5 million gallons of diesel fuel, 400,000 gallons of gasoline, as well as unknown amounts of lubricants and explosives. Minor amounts of construction materials will be required for service facilities; these materials will be lost to other uses.

Transportation of the ore from the mine to the processing plant at Conda will require 1.2 million gallons of diesel fuel.

Beneficiation of the ore will require about 79 million kilowatt-hours of electricity, about 32 billion cubic feet of natural gas, about 40,000 gallons of gasoline, and about 14,000 acre-feet of water. Converting the calcined rock to fertilizer will require about 880 million kilowatt-hours of electricity, 40,000 gallons of gasoline, and 9 million tons of sulfuric acid. These resources will be lost to other uses.

CHAPTER VIII
ALTERNATIVES

Alternatives that apply to the South Maybe Canyon, Champ and Mountain Fuel proposals are discussed in part 5.1, chapter VIII.

The following alternatives apply specifically to the Mountain Fuel proposal.

Beker proposes to haul ore 8 miles over private road in 50-ton truck units to the railroad at Maybe Canyon. An alternative is the proposed extension of the Dry Valley rail spur. It would probably have impacts similar to those of the haul road. The Mountain Fuel and Champ sites are both within a mile of the proposed railroad. If the proposed railroad serves other mines, it will have less impact than separate haul roads. The alternative of restricting access to the rail route through Dry Canyon would eliminate impacts on the elk calving ground that would be crossed by access routes directly from the Maybe Canyon mine.

Complete backfilling would lessen the impact of 96 acres of waste dumps, but would still require temporary dumping outside the pit.

PART 6

EARTH SCIENCES, INC.

PARIS-BLOOMINGTON MINING PLAN

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PART 6
EARTH SCIENCES, INC.

Earth Sciences, Inc, (ESI) proposes the development of the Paris-Bloomington underground mine to supply high-grade phosphate ore for the production of fertilizer. As a potential byproduct, vanadium may be extracted from the ore. Plans call for producing 1.5 million tons per year of phosphate rock. The proposed beneficiation plant, not yet designed or sited, is planned for construction on private land near the minesite. Newspaper articles have reported the possibility of future sale of beneficiated rock from this property to Canadian interests. Company officials indicate vanadium sales are being negotiated with several companies. In addition to vanadium, the company is interested in recovering silver, and possibly selenium from the ore. Management anticipates beginning mining in 1977. At a rate of 1.5 million tons per year, to the year 2000 A.D., 33 million tons will have been mined, leaving reserves estimated at 14 million tons. The mining involves Federal phosphate lease I-012982 and Federal phosphate prospecting permit 1-3557 along with a much larger acreage of fee-owned land. Of approximately 4,000 acres, only 540 acres are covered by the Federal lease and permit. The proposed operation is not dependent upon approval to mine the Federal lease, and could be implemented without such approval.

This project will mark the initial entry of the corporation into the southeast Idaho phosphate field.

CHAPTER I
DESCRIPTION OF THE PROPOSED ACTION

The proposed Paris-Bloomington mining project is located on the north side of Bloomington Canyon, approximately 1 mile west of Bloomington, Idaho (fig. 6-1). The project includes an area covered in total by 12 mineral leases, including a part of Federal phosphate lease I-012982 (65.74 acres). Also included are two leases from the State of Idaho totalling 600 acres, nine mine-fee properties, and one Federal prospecting permit. The prospecting permit, I-3557, covers 474.96 acres. In addition, ESI holds more leases and properties near or adjacent to the project. With the exception of two small tracts owned by the State of Idaho, all surface is privately owned. Federal actions are required on the Federal phosphate lease I-012982 and the prospecting permit I-3557.

Star mines No. 1, 2, and 3, in part of Sec. 16 and Sec. 21, T. 14 S., R. 43 E., are located in the project area. No details of past mining are given. Several exploration drill rigs were operating in 1975, and experimental mining is proceeding to obtain a bulk sample for metallurgical tests.

Subsequent to filing the mine plan the result of a drilling exploration program on private and permit land suggests a more suitable entry to the deposit would be an adit driven from the east rather the entry from the south. This concept would entail a change in the location of the portal, ventilation shaft, access road and surface facilities. Final consideration of approval or disapproval under Federal Regulation 30 CFR 231 will await resolution of the mine entry location. The following details are also lacking at this time and will be required for final consideration:

1. In the event water is encountered in the workings a sump is proposed at the bottom of the ventilation shaft. The plan should discuss method of disposal and monitoring of the water quality prior to disposal.

2. Dust suppression will require 2000 gals. of water/minute. The source of the water is not identified.

3. Metallurgy for recovery of vanadium in the lower portion of the upper phosphate bed has not been worked out. Until the process for vanadium-phosphate recovery is developed the degree of resource recovery is not known. Approval of the mining plan is dependent upon maximum resource recovery.

4. Route selections for utility systems and ore haulage to mill are not discussed in detail.

5. To minimize the possibility of surface subsedence the plan should indicate a buffer zone inward from each mine portal and ore outcrop that will be excluded from mining.

6. Route for access road to ventilation shaft collar, referred to as a trail in the plan, is not discussed.

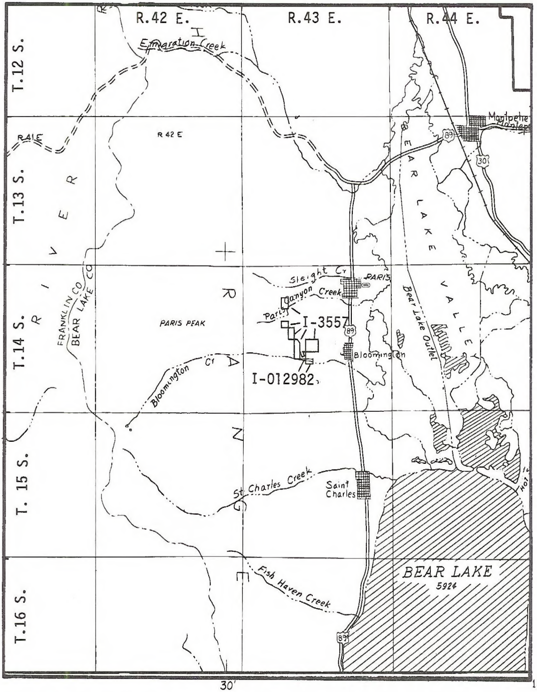

Figure 6-1.--Location of Federal phosphate lease and prospecting permit for the proposed Paris-Bloomington mine.

A. PROPOSED MINING OPERATIONS

The following has been extracted from the mining plan submitted to the Conservation Division, U.S. Geological Survey on December 30, 1974 by ESI, in accordance with 30 CFR 231.10. Information in a preliminary impact assessment prepared by VTN Inc. and submitted to the U.S. Geological Survey on February 28, 1974, and information from interviews with company personnel are also utilized.

The gently dipping section of the ore beds will be mined by underground methods (figs. 6-2 and 6-3).

At this site, an upper phosphate ore zone about 15 feet thick directly overlies an 11-foot ore zone that contains recoverable vanadium. Another phosphate ore zone 6 to 23 feet thick lies about 160 feet beneath the upper phosphate zone. The ore body is broken into several large blocks by geologic faults. The attitude and elevation of the various blocks are sufficiently different to warrant a mining plan tailored to each.

The mining plan is for Block A. Block A extends about 1,450 feet from the outcrop northward down dip to a steep east-west fault. The block is about 3,600 feet wide; it is cut off on the east by another fault and on the west by the axis of a syncline.

Block A will be developed by driving a conveyor tunnel down the middle of the block from the surface almost to the north boundary fault. The floor of the tunnel will be at the base of the vanadium-rich zone. A ventilation shaft at the end of the tunnel will function as an exhaust raise. Next a peripheral tunnel will be driven around the east half of Block A. Starting near the portal, it will go eastward, paralleling the outcrop but avoiding the weak near-surface strata; thence north parallel to the east boundary fault; thence west parallel to the north boundary fault to join the conveyor tunnel at the ventilation shaft. As soon as the peripheral tunnel is completed an airlock will be installed to direct 45,000 cubic feet of fresh air per minute into each opening. After circulating through the mine workings the air will exit the mine through the ventilation shaft. Brattice cloth barriers and auxiliary blowers will direct fresh air into critical areas.

Room and pillar ore extraction will start at the northeast corner of the east half of Block A and retreat toward the conveyor tunnel; 25 percent of the ore will be left as roof support pillars. The upper phosphate zone will be extracted first using the necessary ramps to the haulage level. After this horizon has been retreated an adequate distance to obviate conflicts, the vanadium-rich lower zone will be extracted by the same retreating process. This lower zone will be developed in the same manner as the upper zone, with all openings vertically below those of the upper zone. Extraction of the lower zone can be done at any time or distance after extraction of the upper zone, but it must never precede it.

Continuous-mining machines will remove the ore and place it in diesel-powered shuttle trucks. The trucks will carry the ore to a belt

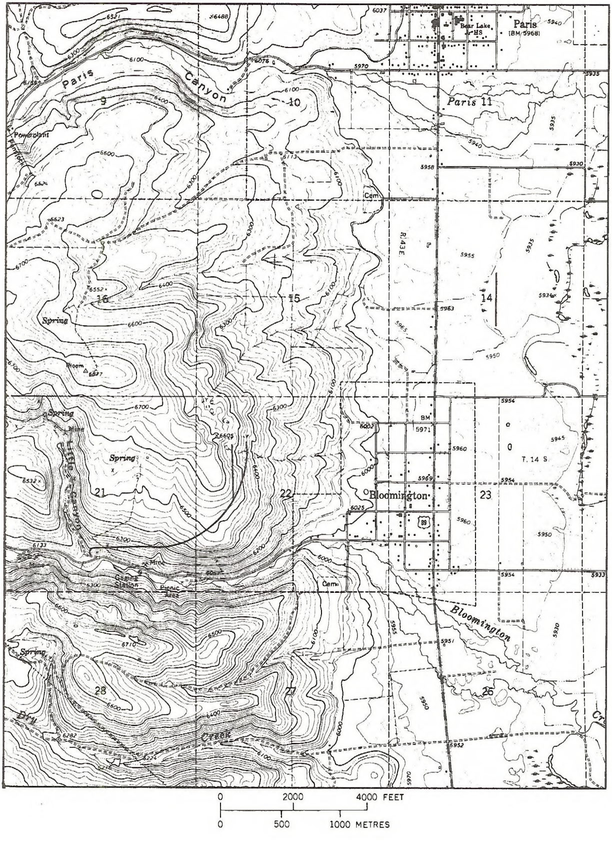

Figure 6-2.--Mining plan proposed for the Paris-Bloomington site.

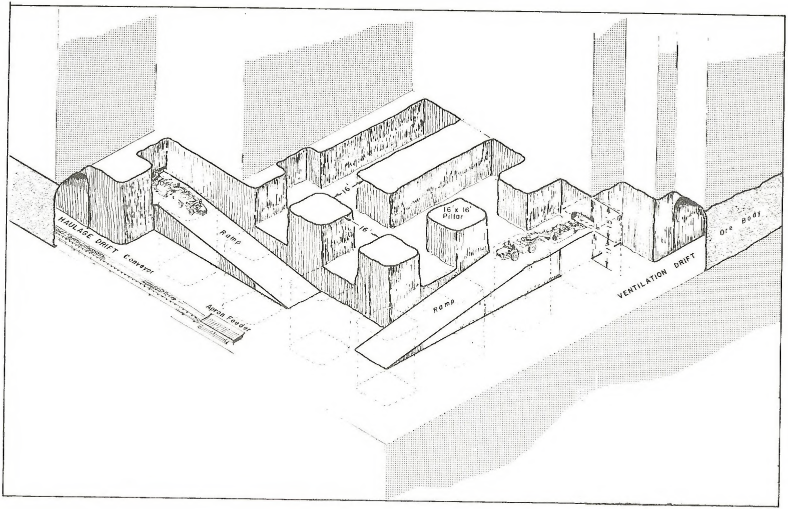

Figure 6-3.--General mining procedure proposed for the Paris-Bloomington underground mine. Reproduced from mine plan.

loading station on the electric-powered conveyor in the main haulage tunnel. The conveyor will carry the ore to an ore bin or bins near the tunnel portal.

In addition to the roof support pillars, other roof support may be found necessary. Roof bolts and shotcrete will be used as required.

B. RECLAMATION

About 1,400 tons of waste rock from boring of a vertical ventilation shaft and escapeway will be stockpiled on the surface at the portal. Any waste rock from driving conveyors through fault dislocations will be stowed in worked-out areas.

All roads and plant sites will be restored to the original contour. Where the surface is disturbed or an excavation is made, the soil will be removed and stockpiled. The stockpiled material will be revegetated. Upon mine abandonment, the stockpiled topsoil will be redistributed over formerly disturbed areas, which have been backfilled and graded. All 17 acres disturbed by mining--3 acres for dumps, 12 acres for roads, and 2 acres for other uses--will be reclaimed.

Restored areas will be spread with 200 pounds per acre of 20-10-10 fertilizer and seeded with 15 or 20 pounds per acre, depending on the broadcast method, mechanical or hand. The following seed mix will be used:

Smooth brome	10 lbs/Acre
Intermediate wheat grass	5 lbs/Acre
Sweet clover or ranger alfalfa	2 lbs/Acre
Timothy or bluegrass	3 lbs/Acre

The mix reflects experience under similar conditions, in accordance with the recommendations of the BLM and the Forest Service. As it will be many years before reclamation will be required, the Soil Conservation Service will be consulted to determine then-current methods and means of revegetation.

Upon mine abandonment, all shafts will be sealed with a concrete bulkhead, with the top at least 2 feet below the ground surface. Backfilling and revegetation will then proceed in the same manner as that used in the mine waste dumps. The portals of adits and inclined shafts will be filled with waste, covered with the stockpiled topsoil, and graded to the original contours. All buildings and bins will be removed, the surface graded to the original contour, and the topsoil replaced. All areas of replaced topsoil will be fertilized, seeded, and watered.

C. SURFACE FACILITIES

Surface facilities indicated in the mining plan include haul roads, access roads, a set of structures at the mine portal, electrical facilities, and a water pipeline.

Haul roads from present roads to the mine portal will be required. Possibly 10 years later, another road to possible portals on the east side of the property may be constructed. These will be all-weather roads, with drainage ditches and culverts, and will be used both for transport of ore from the mine and for travel of operating personnel.

In addition to these roads, there will be three or four trails on Federal land to the vertically bored ventilation shafts. Once these shafts have been completed and equipped, the trails will be used only by personnel maintaining equipment in the ventilation shaft and escapeway.

Structures at the portal will consist of a 5,000-ton ore bin, a changehouse for 50 employees, a first-aid station, a mine office, a small warehouse, and a repair shop. A graded parking area to accommodate 50 vehicles will be provided. A small part of this parking area will be reserved for a stockpile of sand and fine aggregate required for shotcrete. A transformer and switching station will be required, the size of which will conform to local regulations. This will be fenced and locked at all times.

ESI states that a pipeline capable of supplying 2,000 gallons of water per hour will be constructed to the nearest available water source. The water source is not identified. The water is required for underground dust suppression and surface sanitary facilities.

Company officials have indicated that feasibility studies of plant sites are in progress. Consideration is being given to sites on the property, on top of the ore body, and at Montpelier. Phosphate beneficiation will involve a calcining plant, and vanadium recovery would involve roasting and leaching. The final flow-sheet may require another year or more for development. Announcements and information from ESI indicate that the ore will be beneficiated in the Paris-Bloomington-Montpelier area or on the property. As of late January, 1976, ESI indicated it would soon begin construction of the beneficiation plant, scheduled for completion in 1978. The construction and operation of the plant is not contingent upon decisions on actions considered in this statement. ESI also states that the transportation alternatives being considered to move the raw ore to the mill are: rail, truck, slurry-line and cable-belt conveyor.

CHAPTER II
DESCRIPTION OF THE EXISTING ENVIRONMENT

A. NATURAL ENVIRONMENT

1. CLIMATE

The general climate of the area is described in Part 1. Temperatures at the minesite are probably a few degrees cooler than at Montpelier. The growing season is about 60 days. Precipitation at the minesite, is probably more than at Montpelier because of spillover effect from the Bear River Mountains. Snow lingers into late spring or early summer because of shading by the Bear River Mountains. Winds probably sweep the tops of the foothills at the mine bare of snow and deposit drifts along the ridges paralleling Bloomington and Paris Creeks. No weather data are available near the site.

2. LAND RESOURCES

a. Land Surface

The proposed underground mine is on the north side of Bloomington Canyon, and on the west side of Bear Lake Valley in a subdued mountainous terrain of low relief. Bloomington Canyon is straight and steep-sided. Maximum relief on the site is about 750 feet.

b. Geology and Mineral Resources

The mine portal is on an outcrop of the Meade Peak which dips about 15 degrees northwest. At the minesite, the Meade Peak is about 200 feet thick; total thickness of the lower and upper phosphate zones ranges from 21 to 38 feet. The upper zone averaging 15 feet is a phosphatic zone; a vanadiferous zone averaging 11 feet thick directly beneath the upper phosphate zone, contains both phosphate and vanadium in recoverable amounts.

About 47 million short tons of phosphate rock will be produced, of which 33 million are scheduled to the year 2000. Resources of significant elements in the 33 million tons of ore, based on regional averages and local determinations for some elements in the rock of the vanadiferous zone, are 760 thousand short tons of fluorine, 53 thousand short tons of vanadium, 3.5 thousand short tons of uranium, and 29 thousand short tons of rare earths. If processes for the recovery of selenium, zinc, and silver from the vanadiferous zone are successful, these elements will be recovered. Selenium concentrations average 560 ppm, which amounts to a potential production of 3,900 short tons. Zinc averages 2,400 ppm, which would amount to a production of 17,000 short tons; silver, averaging 16 ppm, could yield 110 short tons.

Thallium and cadmium are also significant in the vanadiferous zone rock. Based upon average concentrations of 40 ppm and 470 ppm respectively, 280 short tons thallium and 3,300 short tons cadmium could be recovered. If thallium can be recovered, the amount present in the vanadiferous zone will make up a large part of the U.S. reserves.

c. Soils

Landtype association 7 covers the entire area. This landtype association is described in detail in Part 1, Chapter II.

3. WATER RESOURCES

a. Water Supply

1. Surface Water

Paris and Bloomington Creeks flow eastward from the Bear River Mountains through or adjacent to the leaseholds. These streams are fed by large springs. Both streams are developed for municipal and irrigation water supplies. Other springs flow from the mine area (figure 6-2). Characteristics of the individual springs are not known except that their flows may be similar to flows of Paris and Bloomington Creeks which have well sustained base flows. Many springs flow at elevations about that of the proposed mine. The emergence of the ground water at the surface appear to be associated with the Phosphoria Formation. Surface runoff from the mine area is probably only a few inches per year. The estimated 15 to 20 inches of precipitation could easily percolate into the soil and feed springs, replace soil moisture, and be evaporated or used by vegetation. Surface runoff from the mine area probably does not exceed a few hundred acre-feet annually. It appears likely that sizeable underground flows fed from areas above the mine area may pass through the ore body or near it. The underground mining operation may contact considerable underground water and may alter flows from springs in the vicinity.

2. Ground Water

Drill-hole data indicate that Meade Peak Member of Phosphoria Formation at this site contains water. Water probably also occurs in the Dinwoody and other formations. Although no data are available, the Wells Formation, which underlies the Phosphoria probably contains water in considerable quantities.

All the water-bearing formations at this site probably will yield enough water for domestic and livestock use. The yield of the Salt Lake Formation is erratic, but in some places may be enough for limited irrigation. The water in the Wells Formation and in Bloomington Creek is hydraulically connected, so that water from the creek probably continually moves down dip in the Wells Formation toward the proposed minesite.

The water that percolates into the Dinwoody and Phosphoria Formations probably moves generally northward until it intercepts one of the numerous fault systems, and then drains toward Bear Lake Valley.

Numerous springs occur near the contact of the Salt Lake and Dinwoody Formations.

b. Water Quality

The data below are for samples collected from Bloomington Creek in February 1961, June and September 1967, and January, May, and July 1968.

	Range	Average
Discharge (cfs)	13-24	19
Dissolved solids (ppm)	158-194	179
Calcium (ppm)	35-46	43
Bicarbonate (ppm)	177-232	216
Nitrate as NO_3 (ppm)	0.1-0.6	.4
Orthophosphate as PO_4 (ppm)	0.00-0.11	.03

On July 23, 1968, calcium and magnesium made up 64 and 34 percent of the cations, respectively, while bicarbonate comprised 96 percent of the anions.

One analysis for a well (14S43E35bba1) a little more than a mile south of the mine portal illustrates the similarity between ground water and streamflow. The dissolved solids of the well water are higher (336 ppm) than water of Bloomington Creek but calcium and magnesium are still present in roughly the same relative proportions (53 percent and 34 percent of the cations, respectively) and bicarbonate is predominant (91 percent) among the anions.

No sediment concentration data are available for Bloomington Creek. Visual observation of the stream in January 1975 indicated that the water was fresh, clear, and well-aerated.

4. AIR RESOURCES

In general, air quality in the vicinity of the proposed minesite is good. Some particulates enter the air as a result of nearby mining, but no quantitative data are available. Amounts are probably small. Some dust and particulates also enter the air along roads in the vicinity as a result of vehicular traffic.

5. VEGETATION

The mining premises cover approximately 790 acres of agricultural land, 230 acres of sagebrush-grass. Some riparian vegetation is found along stream channels. There are very few timber-size trees on the area. The 66 acres of the Federal phosphate lease are mainly sagebrush-grass.

No rare or endangered species are known.

6. WILDLIFE

The area is used year-round by sage grouse and is an important winter, nesting, and brood-rearing habitat. The long ridge on the northern edge of the site is a popular sage grouse hunting area in the fall. Blue grouse inhabit the area during the spring and early summer, using portions of it for nesting and brood rearing. About 50 deer winter in the area. An occasional elk and moose have been seen. Greater sandhill cranes inhabit the area during the late spring, summer, and fall.

No threatened or endangered species are known to inhabit the minesite area; however, suitable habitat for whooping cranes is present less than 1 mile east of the site.

7. FISHERIES

Bloomington Creek contains both hatchery and wild rainbow trout and supports brook trout, and furnishes excellent fishing opportunities. In 1975, the Idaho Fish and Game Department counted 39 rainbow trout and 5 brook trout per each 100-yard segment of stream. Although Paris Creek dries up in the lower segment from agricultural diversions and power production, it contains rainbow trout above the diversion.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Dairying is the predominant farm activity in the Paris-Bloomington area, followed by hay and dry-land grain operations. Beef cattle graze the nearby forested areas in summer, but are dependent on hay and grain throughout most of the year. Generally the farms are small. Irrigated and meadow pastures are used to support local beef and dairy operations. The leasehold is grazed.

Twenty-six small cattle operations are permitted to use approximately 54 sections of National Forest lands and one section of National Resource lands adjacent to and uphill from the lease areas for 881 cattle from June 26 to September 15.

One livestock operator is permitted to graze 80 acres of National Resource lands within the boundaries of the mining area in conjunction with privately-owned lands. The permit authorizes 355 cattle and 11 horses sometime between May 16th and September 30th.

2. SOCIOECONOMIC DEVELOPMENT

There is some experimental underground mining on private lands adjacent to the proposed minesite area. The area is predominately rangeland.

3. TRANSPORTATION AND UTILITIES SYSTEMS

A single-lane unsurfaced spur road off the Bloomington Canyon road provides access to the minesite. The road departs the double-lane graveled Bloomington Canyon road approximately one and one quarter miles west of Bloomington and runs along the south-facing slopes of Bloomington Canyon to the mine portal.

Approximately two miles of the single-lane, graveled Sleight Canyon road and the double-lane, graveled, Paris Canyon road lies within the project boundaries. In addition, primitive agricultural and mining-related access roads cross the area.

No utilities systems are located within the lease area.

4. RECREATION RESOURCE

The area offers a large variety of recreational activities. It is heavily used by snowmobile and four-wheel drive vehicles. Deer and grouse hunting are popular. Campers, usually hunters, use the west part of Bloomington Canyon where the terrain is level. Bloomington Creek is a good trout fishing stream and there is also fishing in Paris Creek. The site is near Bear Lake, which is the largest recreation attraction in the area.

5. ARCHEOLOGIC AND HISTORIC VALUES

The minesite includes no registered historic sites. Reconnaissance examination of the area was made in 1975 by Professor B. Robert Butler, Curator of Archaeology and Acting Chairman of the Department of Anthropology, Idaho State University. During the survey, the only object of archaeological note was a small, steep-end scraper of grey chalcedony, found on the west side of Little Canyon, just north of the fence along the road and about thirty feet from the creek channel. No chipping detritus or other indications of a prehistoric site were observed in the vicinity of this find.

6. AESTHETICS

Aesthetic interest is high, but mining exploration and other related activities have reduced aesthetic quality in parts of the area. Discordant elements are not numerous in the landscape, but do diminish its visual qualities.

CHAPTER III
ENVIRONMENTAL IMPACTS

The impacts described here are those for the total mining proposal on slightly over 1,000 acres. The Federal action involved is limited to decisions relating to mining on a Federal phosphate lease and approval of a prospecting permit on an additional 475 acres.

A. NATURAL ENVIRONMENT

1. LAND RESOURCES

a. Land Surface

The impact of the proposed underground mine upon the land surface is minimal. About 20 acres of land will be cleared. Only a small dump, about an acre in area, will be created. Some subsidence of the land surface over the mine area is possible if roof failures occur. The effect, however, should not be large.

b. Geology and Mineral Resource

Mining of both the upper phosphate zone and the vanadiferous zone will remove 33 million short tons of phosphate rock by the year 2000, including 760,000 short tons of fluorine, 53,000 short tons of vanadium, 3,500 short tons of uranium, 29,000 short tons of rare earths, 3,900 short tons of selenium, 110 short tons of silver, 17,000 short tons of zinc, 280 short tons of thallium, and 3,300 short tons of cadmium. Of these resources, phosphate, vanadium, and possibly selenium, silver and zinc will be recovered for use.

c. Soils

Mining will disturb 17 acres of soils at the minesite. About 55 acres of soils will be disturbed by about 12 miles of haul roads and rail lines off the site.

2. WATER RESOURCES

a. Water Supply

1. Surface Water

The principal surface-water impacts of the underground mining will result from mine drainage, roads, stockpiles, parking areas, and beneficiation or other plants. Mine drainage may decrease some spring flows and reduce or otherwise alter some stock water or irrigation supplies. The streamflow characteristics of Paris and Bloomington Creeks also may be somewhat altered.

2. Ground Water

Because mining will progress below the level of Paris and Bloomington Creeks, seepage into the mine probably will occur under considerable hydrostatic pressure from formations both below and above the proposed mine. The quantity that might seep into the mine cannot be estimated with presently available data.

If seepage into the mine is severe, local ground-water levels will decline and reduce the flow of Paris and Bloomington Creeks in the reaches adjacent to the mine. The discharge of nearby springs also could be reduced. However, any water pumped from the mine will probably be ultimately disposed of in Paris and Bloomington Creeks; thus, the discharge from these creeks into Bear River probably would not be reduced significantly.

If wet processing is used, about 1,500 gallons per minute of water will be required for the proposed beneficiation plant and possible vanadium-recovery plant.

b . Water Quality

Water quality in Paris and Bloomington Creeks will likely be affected by mining operations. Sediments will increase by an undetermined but likely small amount during construction of the haul road and adits.

The proposed beneficiation plant will likely affect water quality. For example, beneficiating ponds at Conda contain solutions having relatively high nitrate concentrations (11-45 ppm) and could contribute to the nitrate load in ground water. Furthermore, calciner ponds contain significant concentrations of toxic elements in addition to nitrogen species.

The mine and plant operations planned for this site may potentially affect Bear Lake. A recent study (EPA, written communication, 1976) shows that nearly half of the present phosphate load is pumped into Bear Lake via the Utah Power and Light pump station located between Bear Lake and Mud Lake (Dingle Swamp). The study indicates that Bear Lake water is seasonally phosphorous limited and that pollutants presently being pumped in are causing it to be mesotrophic. Increases in the phosphorous concentration of the water being pumped in or entering otherwise could cause accelerated eutrophication of Bear Lake. Such increases could result from discharges or runoff of nutrients from the Bloomington Creek phosphate operations, which may reach Dingle Swamp.

For further details of other impacts see Part 1, Chapter III - Water Quality.

3. AIR RESOURCES

The proposed mining activities will have little effect on the air quality. Some dust and emissions from vehicles will result from the mining operations, especially during the dry season. Some changes in the local microclimate, such as patterns of snow drifting, would occur.

The proposed beneficiating plant will cause some reduction in air quality, mainly from emissions of particulates. Depending upon the type of fuel consumed, and the exact composition of the ore, the impacts would likely be similar to those of the beneficiation plant proposed for the Diamond Creek area (see Part 4).

4. VEGETATION

Vegetation will be removed from about 17 acres by mining and from 55 acres for the haul road. Forage production on this acreage ranges from 400 to 1,600 pounds air dry weight per acre. Damage to vegetation is expected to be minimal from dust and vehicle exhausts associated with the mining operation.

Vegetation will also be removed from about 110 acres for the proposed beneficiation plant as well as the possible vanadium recovery plant. They would likely be similar to those of the present beneficiation plants at Pocatello and Conda, and that proposed for Diamond Creek (see Part 4). Precise impacts cannot be evaluated until locations are selected and the plants are designed.

5. WILDLIFE

Although surface disturbance is minimal, the mining-associated activities will disturb several significant species including sage grouse, blue grouse, and deer. According to the Idaho Fish and Game Department, as many as 100 deer may be disturbed or possibly lost. Sandhill cranes and other non-game species will also be affected more by disturbance than loss of habitat.

The proposed revegetation program will not greatly benefit deer, sage grouse, or blue grouse, since mainly grasses will be planted. Secondary succession may restore browse plants on some of the sites.

The impact of proposed processing plants on the site is unknown, but will depend on their location and method of operation.

6. FISHERIES

Because the proposed mining operation is underground, impacts on the fisheries can be controlled. The mining plan does not propose any direct stream disturbance. If portal water discharge is minor. since the mining plan does not call for large waste dumps, the mining should have little impact on the fisheries. However, if underground adits intercept ground water, and portal discharge is high, impacts on fisheries could be moderate, resulting in reductions of fish populations.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

The mining will have low impact on the present grazing operations. About 17 acres of range and pasture land will have its forage yield reduced or eliminated by the mining activity. Based on an average of

1,000 pounds of usable forage per acre, a potential loss of 25 AUM's of forage valued at about $150 annually can be expected. About 2,400 acre-feet per year of water will diverted for processing

2. SOCIOECONOMIC DEVELOPMENT

The proposed mine will employ about 170 people when fully operational. The socioeconomic impacts at the site are minimal and by themselves are not significant. However, coupled with other proposed activities, they constitute in the aggregate significant socioeconomic impacts on a regional scale as described in Part 1.

3. TRANSPORTATION AND UTILITIES SYSTEMS

The Bloomington Canyon road will undergo progressive deterioration as a result of the increased traffic volumes and loads associated with the proposed mining operation or additional costs will be incurred in maintaining the road.

The electrical needs of the project will likely exceed that available from the transmission lines serving the immediate area.

Further discussion of the impact on the transportation and utilities systems serving the proposed mining operation is given in Part 3.

4. RECREATION RESOURCES

The mining activity will reduce the attraction of the area for picnicking and pleasure driving. Snowmobile and four-wheel-drive vehicle use will still be possible and ORV access into the area may even be increased with the increased activity. However, the area actually suitable for such ORV activity will be somewhat less as a result of mining activities.

The proposed underground mine and associated processing plants may have a positive effect as an educational experience for school groups and others.

5. ARCHEOLOGIC AND HISTORIC VALUES

The archeologic survey revealed no archeologic sites on the leasehold which would be impacted by the proposed action.

6. AESTHETICS

The proposed mining will have low impact on the aesthetic quality of the area. However, the related processing plants will be highly visible from the Bear River valley and conflict sharply with the present high aesthetic quality of the area.

CHAPTER IV
MITIGATING MEASURES

State and Federal laws, regulations, and administrative policies that require mitigation or reclamation of mining areas, and requirements of the surface-management agencies and the USGS District Mining Supervisor are discussed in detail in Part 1. These mitigating measures shall be required at this minesite. Other possible mitigating measures as discussed in Part 1, Chapter IV, shall also be required as appropriate.

The following company proposals for mitigating impacts are taken from the mining plan and accompanying environmental assessment.

Upon completion of the project, the company plans to blend all disturbed areas with the contours of the surrounding landscape. Surface soils will be stockpiled and spread over disturbed areas to enhance revegetation. These areas will be seeded, fertilized, and treated with soil amendments as necessary. A small amount of wastes will be backfilled into mine portals. Any subsidence that does occur will be fenced to exclude livestock, wildlife, and humans.

Erosion will be controlled by use of mechanical, chemical, and/or vegetative techniques. Wide buffer zones between disturbed areas and perennial streams will be left in natural vegetation to act as sediment traps.

Ground-water intercepted by mining will be transported to the surface and channeled into settling or evaporation ponds to mitigate possible impacts on existing surface waters. Impacts on water quality will be mitigated by use of settling ponds, and/or evaporation ponds, as necessary. The company will provide substitute water supplies to replace springs affected by mining.

The mitigating measures as proposed partially fulfill those requirements of the surface-management agencies and the USGS.

CHAPTER V
ADVERSE EFFECTS THAT CANNOT BE AVOIDED

Because this is an underground mine, there are no significant adverse effects to the land surface. About 25 percent of the phosphate resource (about 16 million tons) will be left in pillars.

Disturbance of soils on 17 acres in the mining area cannot be avoided. Also unavoidable is disturbance of an undetermined number of acres of soil required for the processing plant.

Ground-water levels will unavoidably be lowered, reducing nearby spring and stream discharge. Water required for proposed processing plants at this site, estimated at about 2,400 acre-feet per year will be consumptively used. Some sedimentation resulting from discharge of minewater and from construction will occur; the severity and duration of the impact will depend upon operating and construction procedures and the effectiveness of the proposed mitigating measures, but will likely be very low. Construction of the proposed processing plant, not yet designed or sited, will cause an undetermined short-term moderate-to-high increase in sediment. Operation of the plant will cause a long-term low impact on both chemical quality and sediment in the streams.

Some reduction in air quality from emissions from the proposed beneficiation plant is unavoidable. Air quality, however, will likely remain above ambient air standards and below the State air quality standards.

Removal of vegetation and loss of productivity from 17 acres cannot be avoided during mining. Removal of vegetation and loss of productivity from an undetermined number of acres from processing plants also cannot be avoided.

Loss of perhaps 100 deer that winter in the area cannot be avoided, largely through disturbance rather than loss of habitat. Disturbance of breeding, nesting, and brood-rearing habitat of less than 70 acres for blue and ruffed grouse cannot be avoided. Some displacement of the sage grouse because of disturbance is unavoidable. Minor to moderate reduction of fish populations is probably unavoidable.

The present undeveloped visual quality of the area will be unavoidably lowered by the proposed beneficiation plant.

CHAPTER VI
SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

Starting in 1978, over a period of more than 30 years, 47 million short tons of phosphate rock will be mined, beneficiated nearby, and removed from the site for processing into fertilizer at a plant in Utah. About 33 million tons will be mined by 2000 A.D., as originally proposed; at a revised rate as shown in table 1-1a, 24 million tons will be mined by 2000 A. D.

The mining will create a short-term disturbance to soils on about 20 acres. It will also impact water resources by lowering groundwater levels, and causing some lowering of water quality. Low sediment increases in Bloomington Creek should be short term, resulting from surface disturbances. About 2,400 acre-feet per year of water will be required for the proposed beneficiating plant. Disturbance to wildlife will likely be short term inasmuch as habitats will not be significantly altered. Disturbance to wildlife will be largely from activity in the area rather than loss of habitat.

There will be little loss in long-term productivity of the area from mining. The 17 acres of disturbed soils will be revegetated and wildlife habitats will not be significantly lost or degraded. The aesthetic quality of the area and its recreational opportunities will be lessened during the mining operation. The proposed processing plants, however, will have long-term effect upon the aesthetic character of the area by conflicting with the somewhat natural landscape and contrasting with its surroundings.

CHAPTER VII
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

About 47 million tons of ore will be mined and processed. Based on mining as originally proposed, about 33 million tons will be mined by the year 2000 A.D. Along with this, 760,000 short tons of fluorine, 53,000 short tons of vanadium, 3,500 short tons of uranium, 29,000 short tons of rare earths, 3,900 short tons of selenium, 110 short tons of silver, 17,000 short tons of zinc, 280 short tons of thallium, and 3,300 short tons of cadmium will also be removed. The phosphate and vanadium will be recovered for use; the silver, zinc, and selenium may be recovered. The commitment of 2,400 acre-feet of water per year for ore processing is also irretrievable. The commitment of an undetermined number of acres for processing plants and associated settling ponds is largely irreversible. The loss of wildlife to the extent that it cannot relocate in the area after mining is irretrievable. This, however, should be minor.

The mining and reclamation will require 231 million kilowatt hours of electricity and 0.99 million gallons of diesel fuel through the year 2000. Additional undetermined amounts of construction materials will be required for minesite facilities.

Beneficiation of the ore will require about 230 million kilowatt hours of electricity, 130,000 gallons of gasoline, and about 75,000 acre-feet of water according to the company, construction of the plant will require about 4,000 tons of steel, 7,000 tons of concrete, 11,000 tons of aggregate, and 2,000 tons of cement.

At a lesser rate of mining, as shown in table 1-1a, 24 million tons of phosphate will be mined by 2000 A.D., with a proportioned reduction in commitments of other resources.

CHAPTER VIII
ALTERNATIVES

Federal actions are required only on proposed mining on 66 acres of Federal phosphate lease and on a prospecting permit application for 475 acres. Federal action and approval is not required for the proposed mining on more than 1,000 acres of non-federal mineral rights, nor is federal action and approval required for the beneficiation plant proposed on privately-owned lands.

The general administrative options available to the Secretary of the Interior are discussed in Part 1. Rejection of the Paris-Bloomington proposal would probably not stop the mining, but would make it less efficient. Development would still take place on adjoining patented and State-leased lands.

The following are alternatives to the proposed mine plan. Paris-Bloomington is the only underground mine currently proposed. The alternative of surface mining would be environmentally and economically unacceptable because of the high stripping ratios that would be required; it would, however, recover the 25 percent of the ore (about 18 million tons) left in pillars by underground mining. Earth Sciences proposes almost total reclamation of the areas disturbed on the surface; no alternative would be environmentally preferable.

Transportation methods or routes have not yet been specified. Earth Sciences has discussed the general alternatives of rail, truck, slurry pipeline, or conveyor. Of these, the pipeline would probably have the least impact, notably on wildlife. This site is unusual among the proposals in that enough water might well be available for slurry transport. The impacts of the other three alternatives would probably be similar to one another.

PART 7

FMC CORPORATION

DRY VALLEY MINING PLAN

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PART 7
FMC CORPORATION

FMC Corporation is a diversified manufacturer, with 22 percent of its sales in industrial and agricultural chemicals. The industrial chemicals include phosphorus, phosphates, and phosphoric acids. Since 1949, FMC has produced elemental phosphorus from a furnace plant at Pocatello. The phosphate ore for that plant currently comes from the Gay mine on the Fort Hall Indian Reservation about 35 miles northeast of Pocatello.

FMC does not plan a new elemental phosphorus plant in the area, but may expand the present plant when electricity becomes available. The ore from the proposed Dry Valley mine will probably be processed at the Pocatello plant. As originally proposed, mining will probably start about 1981 and continue for 22 years, for a total production of 44 million tons. Although FMC has a large Federal phosphate leasehold in southeastern Idaho, this is its first proposal to mine there.

CHAPTER I
DESCRIPTION OF THE PROPOSED ACTION

The proposed Dry Valley mine will be in Dry Valley, Caribou County, about 14 miles east of Soda Springs, on 1640 acres of Federal phosphate leases I-0678, I-011866, I-014184, I-015097 (fig. 7-1) and State phosphate lease No. 3823, for a total of approximately 2120 acres of phosphate leases. Surface rights are controlled as follows: Forest Service, 360 acres; Bureau of Land Management, 120 acres; State of Idaho, 480 and 1320 acres privately owned, for a total of 2280 acres--160 more than the total leases.

No mining has been done on these leases to date.

The mining plan as submitted lacks sufficient engineering details for final consideration of approval or disapproval under Federal Regulation 30 CFR 231. The following details are lacking at this time and will be required for final consideration:

1. The plan provides for stockpiling topsoil removed from the proposed pit sites. This salvage should also apply to the dump sites and ore stockpile area.

2. Flow monitoring of run-off water should be evaluated to provide data for design of interceptor ditches and culverts. Design and volume of the retention pond are not discussed.

3. Pit cross sections shows certain mining panels are partially backfilled. The waste rock is shown sloped along the pit walls with a haulroad in the pit bottom. The method of keeping the waste in place and protecting the haulroad is not discussed.

4. Location and design of mine surface support facilities are lacking.

5. Electrical power requirements and transmission corridors are not discussed.

The following is taken from the Dry Valley mine plan prepared by FMC and filed with the Conservation Division, U.S. Geological Survey, Pocatello, Idaho, on December 23, 1974; from a summary environmental discussion prepared by consultants; and from interviews with company reprepresentatives.

A. PROPOSED MINING OPERATIONS

The property contains at least two zones of furnace-grade phosphatic shale. Open-pit mining is proposed in four pits, some of which may be worked simultaneously (fig. 7-2). All altered ore will be mined. Pit depths will range from 50 to 350 feet and the stripping ratio will not exceed 2:1. Mining and haulage equipment are not discussed in the plan. Topsoil from the pit and overburden pile areas will be recovered and stockpiled for future use. Ore will be hauled from the mine to a one-million-ton surge pile and tipple area, where it will be

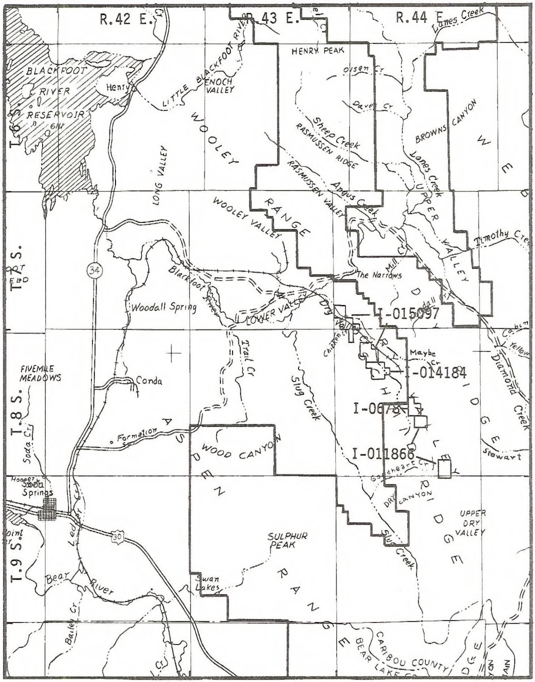

Figure 7-1.--Location of Federal phosphate leases for the proposed Dry Valley mine.

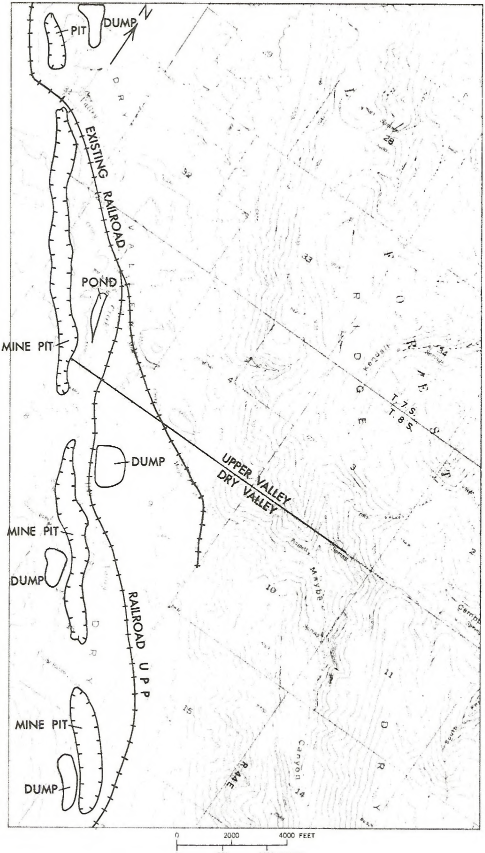

Figure 7-2.--Mining plan proposed for the Dry Valley site.

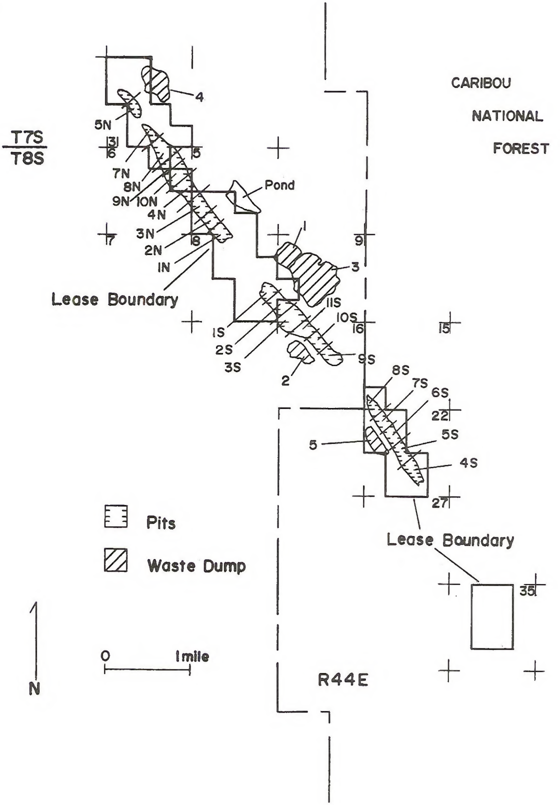

Figure 7-3.--Mining sequence proposed for the Dry Valley mine.

dumped and blended by mechanical means. The ore will be hauled during the summer by unit trains. Mining and stripping will continue year-round. There is no provision to stockpile marginal ore.

Mining (fig. 7-3) will begin in the middle of the site. The plan proposes mining alternately northward and southward to average high and low stripping ratios and equalize mining costs. It will allow complete backfilling of pits in areas of greatest visual impact. Waste from the first panel will be placed in dump 1. After compaction and shaping, the dump will be used for mine buildings, surge-pile, and tipple. Waste from panel 2N will be backfilled into panel 1N, waste from 3N into 2N. Waste from 4N will be placed both in 3N and on dump 3. Mining will then move to the north end of the leasehold. Waste from panels 5N and 6N will be placed in dump 4. Mining will then move south. Waste from panels 7N and 8N will backfill panels 5N and 6N. Waste from 9N and 10N will backfill 7N and 8N and part of 4N; the excess will be placed in dump 3.

The initial half of the waste from panel 1S will be placed in dump 2, the remaining waste in dump 3. Waste from panel 2S will be placed in 1S, waste from panel 3S in 2S and dump 3.

Mining will then move south. Waste from panel 4S will be placed in dump 5. Mining will continue northward; the waste material from each panel will be placed in the previous mined panel. Excess waste will go to dump 3.

B. RECLAMATION

The reclamation plan is aimed toward returning the area to pre-mining condition as quickly as possible to minimize impacts. The plan includes shaping, sloping, and revegetating waste dumps and disturbed areas. Overburden from the initial pit panels and some other areas will be piled in waste-disposal areas and shaped to blend with the topography at a slope of 2.5:1. A quick-growing temporary ground cover will be planted after the pile reaches half its intended size. The following are acreages of disturbed and reclaimed lands:

	Disturbed	Totally Reclaim	Partially Reclaim
Mining (pits)	351	229	81
Waste Disposal	337	337	--
Sedimentation Ponds	18	--	--
Haul Roads	48	48	--
Rail Siding	33	33	--
Totals	787	647	81

Topsoil piles will be shaped, left rough for moisture penetration, and seeded with fast-growing grass species to control erosion.

Interception ditches will be constructed upslope from the pits and dumps to control erosion and siltation; diverted water will be channeled to a relocated stock pond. Culvert systems will further control flow and prevent siltation. Where water seeps are encountered in waste-disposal areas, French drains will be constructed and the flow directed through culverts.

C. SURFACE FACILITIES

A single-track rail spur serves Dry Valley. FMC proposes a siding from this spur to the proposed loading-tipple site. Proposed haul roads parallel the pit and lead to the surge pile, blending area, and tipple. Mine buildings are not described in the plan. They will be built on dump 1, which will be especially constructed and compacted. Water-supply and sanitation facilities for the mine office and shops will be constructed and operated in accordance with applicable regulations. Electrical power requirements and transmission are not addressed in the plan. A beneficiation plant and tailings pond are under consideration by FMC, but no details as to siting are available.

CHAPTER II
DESCRIPTION OF THE EXISTING ENVIRONMENT

A. NATURAL ENVIRONMENT

1. CLIMATE

The general climate of the area is described in Part 1. Average temperatures at the minesite are probably a few degrees lower, and the growing season shorter than at Conda. Annual precipitation for the vicinity of the mine was estimated from data obtained in 1975 by the Idaho Bureau of Mines and Geology (Ralston and Trihey, 1975). These data indicate that precipitation, taking into account redistribution from drifting snow, ranges from 35 inches on the eastern slope of Schmid Ridge to 20 inches in Dry Valley. This distribution is affected by prevailing winds and exposure which impedes snow accumulation on the west slope of Dry Ridge and increases accumulation on the east slope of Schmid Ridge.

2. LAND RESOURCES

a. Land Surface

The proposed mine will extend 5.5 miles along the east flank of Schmid Ridge. The relief between Schmid Ridge and the floor of Dry Valley is about 1,000 feet.

b. Geology and Mineral Resources

The Meade Peak is 177 feet thick, and the lower and upper ore zones total at least 48 feet. It strikes about N. 40° W. and dips about 30° W. There appear to be no structural complexities on the minesite. Production of 38 million short tons of phosphate rock is expected by the year 2000. Estimates of the total resources of some significant elements in the phosphate ore are: 0.91 million short tons of fluorine, 4,200 short tons of uranium, 30,000 short tons of vanadium, and 38,000 short tons of rare earths.

c. Soils

The distribution of landtype associations is shown in figure 7-4 and their characteristics are given in table 7-1. About 85 percent of the area is in landtype association 1 and 15 percent in landtype association 4. Full descriptions are given in Part 1, Chapter II, Soils.

3. WATER RESOURCES

a. Water Supply

1. Surface Water

The proposed mine is within 0.5 mile of Dry Valley Creek and less than 200 feet above it; the pits are near or straddle the creek. About a mile of the pits lies on the southwest slope of Dry Ridge, and

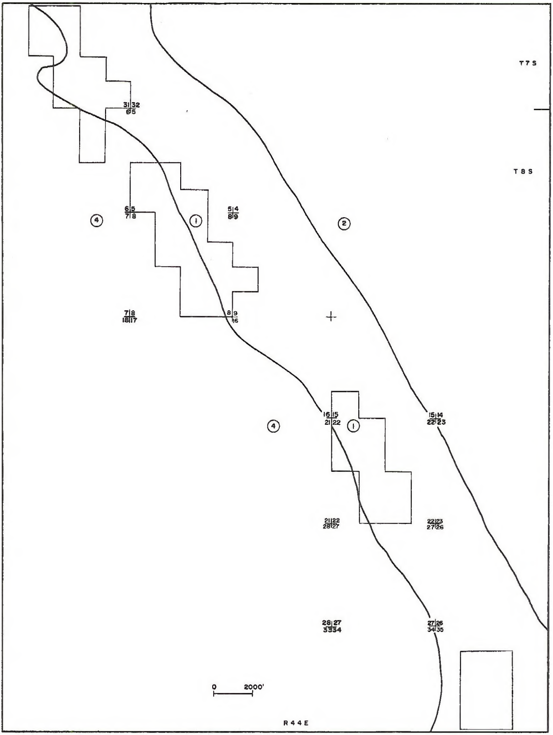

Figure 7-4.--Landtype associations near the Dry Valley site.

Table 7-1.--Physical characteristics of soils at Dry Valley minesite. VL = very low, L = low, M = moderate, H = high, VH = very high

Landtype Assn.	Soil families	Erosion in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road construction hazards	Slope range, in percent	Revegetation potential
			Depth, in inches	Suitability					
1	Cryic Pachic Paleoborolls, fine-loamy, mixed	0.005	10	M	9.2	VL	VL	10-25	VH
	Pachic Cryoborolls, loamy-skeletal, mixed	.001	12	H	4.3	VL	L	1-10	VH
	Cumulic Cryaquolls, fine-loamy, mixed	.000	15	L	3.7	VL	L	0-2	VH
4	Pachic Cryoborolls, loamy-skeletal, mixed	.001	12	H	4.3	VL	L	1-10	VH
	Argic Pachic Cryoborolls, fine, montmorillonitic	.015	12	M	9.0	M	M	25-45	M
	Cryic Pachic Paleoborolls, fine, montmorillonitic	.015	12	M	9.0	M	M	20-40	M
	Argic cryoborolls, fine, montmorillonitic	.015	8	L	8.0	M	M	25-45	M

the rest is on the northeast slopes of Schmid Ridge. Two spring-fed streams cross the site of one proposed pit. Drainage from about 4 square miles crosses the proposed pit area; all of Dry Valley Creek drains about 21 square miles. Most of the drainage area is relatively low--near 7,000 feet, so precipitation and runoff are probably relatively low. Snowdrifts cause non-uniform runoff, with higher runoff from the north and east slopes. Water yield probably averages about 12 inches per year, that is, about 2,500 acre-feet per year from the slopes into the mining area. Total water yield from Dry Valley Creek probably averages 15,000 acre-feet or more annually. There are several springs near the proposed mines, but their flow characteristics are not known. Considerable water likely flows through the alluvium of Dry Valley, and there appears to be considerable interchange between ground water and surface water. An old beaver dam at the proposed minesite indicates that the stream at that point may be perennial for most of the year.

On June 5, 1975, Dry Valley Creek at the Caribou National Forest boundary was flowing about 5 cfs. High-water marks were about a foot higher; flow for this peak, which was in several channels, was estimated at about 30 cfs. Surface flow on June 5 and during peak runoff extended to Blackfoot River. Based on regional data, peak flows several times higher can be expected.

2. Ground Water

The low ridges in which the pits will be dug are separated by perennial tributaries of Dry Valley Creek. Test-hole data indicate that ground water will seep into these pits. Water probably occurs in the alluvium along Dry Creek and its perennial tributaries and in the rock units both above and below the altitude of the creek. Data from the Idaho Bureau of Mines and Geology indicate that water levels in the alluvium may be substantially below the level of Dry Creek. The general ground-water gradient in the area is northwest. Water in the alluvium moves into Dry Creek; that in the Dinwoody Formation in Schmid Ridge probably moves toward and along the axis of the ridge.

b. Water Quality

Analytical data for Dry Creek are provided in Beker Industries' Environmental Analysis Report. Additional data are given in Part 1 and Part 5. Analyses of 8 samples taken April 15 to June 17, 1974, are:

	Range in Values
Dissolved oxygen (mg/l)	8-12
Total Phosphorus (ppm)	0.00-2.0
Suspended solids (ppm)	0-227
Turbidity (formazin turbidity units)	6-76

Beker also reported data for a site identified as "Dry Creek above Dry Creek Narrows." Analyses of 9 samples taken there between April 8 to June 17, 1975 are:

	Range in Values
Dissolved Oxygen (mg/l)	7-11
Total Phosphorus (ppm)	.00-1.9
Suspended solids (ppm)	0-86
Turbidity (formazin turbidity units)	7-33

These values at both sites are within the range of natural conditions. The higher values are associated with the peak runoff during that period.

4. AIR RESOURCES

The present air quality near the proposed minesite is good. Traffic causes minor amounts of particulates and emission, especially along unpaved roads.

5. VEGETATION

The leaseholds comprise about 850 acres of sagebrush-grass, 550 acres of conifer-aspen, 250 acres of dryland agriculture, and a few acres of riparian land. Forage production is 800 to 2,000 pounds per acre, air dry weight. Timber is uneconomical to harvest. No rare or endangered plants are known on or near the minesite.

6. WILDLIFE

Deer and elk are common in the area. About 60 elk use the area year round, and 30 cows use an important calving ground on the leasehold. As many as 25 deer use the area during spring, summer and fall, and a few winter in the area. Important deer and elk migration routes cross the area; more than 100 deer cross the minesite in migrating to and from winter range in Montpelier Canyon.

An occasional moose is sighted in Dry Valley, and several sightings of black bear have been reported. Mountain lions probably hunt in Dry Valley. Grouse populations are high: the area includes important sage, blue, and ruffed grouse brood-rearing habitat, and critical winter range for sage grouse. Beaver, muskrat and rabbits are common, and the area includes important habitat for golden eagles, prairie falcons and other raptor species. Greater sandhill cranes nest in Dry Valley annually, and the habitat is suitable for reestablishment for whooping cranes.

No rare or endangered species have been observed on the site; however, peregrine falcons are known to migrate through and winter near the site.

7. FISHERIES

Dry Valley has a small cutthroat trout population, but supports a spawning run of cutthroat trout from the Blackfoot system. The stream is small, and flows are very low and intermittent in late summer and fall.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

The leaseholds include 250 acres of dryland farms. Almost all of the minesite is used for grazing. Current forage production averages about 1,000 pounds per acre, air dry weight.

The Dry Valley Grazing Association is permitted to run 1,504 cattle from June 6 to September 30 on 360 of the 597 acres of National Forest on the leaseholds, in conjunction with adjacent National Forest and private lands. About 5,640 AUM's of forage, valued at $33,220, are consumed annually from the allotment. The allotment is a significant part of the total operation, but the area to be disturbed by mining is less than 2 percent of the total allotment. Two livestock operators use 120 acres of National Resource Lands on the minesite for 750 cattle between May 16 and October 31, in conjunction with their private lands. About 26 AUM's of forage, valued at $150, are harvested annually.

2. SOCIOECONOMIC DEVELOPMENT

There are no dwellings on the leaseholds.

3. TRANSPORTATION AND UTILITIES SYSTEMS

About 2.5 miles of the Dry Valley road and 1 mile of the EPCO rail spur are on the leaseholds. The 46-KW powerline to the Maybe Canyon mine also crosses the leaseholds.

4. RECREATION RESOURCES

The area has excellent recreation resources. It is intensively used for deer and blue grouse hunting because of good access and high wildlife populations. Many snowmachines, motorcycles, and other ORV's use the area. The area is used for recreation year round; however, fall usually attracts the most use, because of autumn colors, hunting season, and firewood needs. No facilities have been developed for recreation in the area, so uses have conformed to the utility roads and natural terrain of the site. The number of visitors to the site is moderate to low, and the duration of visits is typically less than 2 hours. Hunters are the most common visitors. Access into the area is good via the road in Dry Valley.

5. ARCHEOLOGIC AND HISTORIC VALUES

The minesite includes no registered historic sites. The area just east of the leaseholds was reconnoitered by Evan DeBloois, Regional Archeologist, Forest Service, who found no evidence of prehistoric cultures. A survey of exploration drill sites was made in 1975 by Professor B. Robert Butler, of Idaho State University. But the entire leasehold has not been surveyed. Ignimbrite flakes and chert with pot-lid flake scars used for fluit-knapping were found downslope from a former aspen grove. Professor Butler recommended archeologic clearance for the exploration site.

6. AESTHETICS

The visual variety class for this area is rated moderate. The proposed mine site is in the foreground and immediate middleground viewing zones of Dry Valley road, which parallels the northeast boundary of the area and crosses the south half of the mine area. The Caldwell Canyon road and low-standard utility roads also cross the area. Aesthetic values are enhanced by the undeveloped character of the area.

CHAPTER III
ENVIRONMENTAL IMPACTS

The impacts described in this chapter are based upon the mining plan as submitted and mining rates originally supplied by FMC.

Based upon a more probable level of mining, as shown in table 1-1a, significant differences in impact areas follows. Mining will remove 28 million tons by 2000 A. D., and disturb 605 acres. Other impacts will be about as described.

A. NATURAL ENVIRONMENT

1. LAND RESOURCES

a. Land Surface

Mining will create 351 acres of pits and 337 acres of dumps. Surface facilities will modify 99 acres. A proposed beneficiation plant near the minesite will modify about 110 acres of which about 70 acres would be a tailings pond. Four segments of pit will be 24,000 feet in total length, 300 to 1,200 feet wide, and 50 to 350 feet deep; backfilling will reduce these depths. Waste rock will amount to about 70 million cubic yards by the year 2000. The waste piles will be smoothed and will have a low profile.

b. Geology and Mineral Resources

Mining will remove 38 million short tons of phosphate rock, which will include 30,000 short tons of vanadium, 0.91 million short tons of fluorine, 4,200 short tons of uranium, and 38,000 short tons of rare earths. Only phosphate and vanadium will be recovered.

c. Soils

Mining will disturb soils on 787 acre; after an initial disturbance of 260 acres, soils will be disturbed at about 25 acres per year.

2. WATER RESOURCES

a. Water Supply

1. Surface Water

Maximum runoff from wastes and dumps could be more than 100 cfs after mining. Dumps will cover more than a mile of surface channels, and flows in other channels will be diverted around the mining areas. Possible failure of inadequately-designed water-control structures would contribute to sediment loads. Since most of the pits will be dug below creek level, possibly into the aquifer in the valley alluvium, water pumped from the pits during mining will increase the flow of Dry Valley Creek. The proposed waste pile in a seep area in the channel of Dry

Valley Creek would reduce the discharge of the creek and could contribute sediment during high runoff if the waste is improperly placed and drained. An old beaver dam indicates that running water may persist in this reach for most of the year.

2. Ground Water

The quantity of ground water that will seep into the proposed pits is not known, but studies are underway by the company to determine the quantity. Pumping from the pits may dewater some springs.

b. Water Quality

Impacts will be similar to those described in Part 1. Water pumped from the pits may not be suitable for return to the creek, because without proper settling, it could carry much suspended sediment.

The Forest Service estimates that during mining of that part of the lease on National Forest lands (about 1/5 of the total area disturbed) sediment yields to lower Dry Valley Creek will increase 5 to 9 times present conditions, and after mining decline to 2 to 3½ times pre sent conditions. Total sediment loads are estimated as moderate during mining and low thereafter.

3. AIR RESOURCES

The proposed mining will have little effect on the air quality. Impacts will be similar to those described in Part 1. Particulates entering the air from mining are estimated at 0.5 lbs/ton of ore mined.

4. VEGETATION

Mining will progressively remove vegetation from 787 acres, of which approximately 670 acres are sagebrush-grass, 50 are agricultural, 40 are conifer-aspen, and 25 are riparian.

5. WILDLIFE

About 25 deer will be lost, and fall migrations of a significant number of deer westward out of Diamond Creek will likely be disrupted during mining. Blockage of a major migration route could displace deer from a current winter range to other ranges which are now near carrying capacity. As many as 60 elk also will be lost. The elk calving area on the southeast end of the minesite currently used by about 30 cows will likely be abandoned during mining. These displacements will reduce herds in the area through increased competition for available habitat.

Sage grouse populations will seriously decline. Eagles and other raptors will decrease through loss of prey habitat. Loss of wet meadows will decrease amphibian populations. The present nesting by sandhill cranes will probably cease during the mining. Present beaver colonies will probably be displaced through disturbance of habitat. Some hunting area for prairie and peregrine falcon will likely be reduced.

6. FISHERIES

Increased sediment rates will reduce the small fish populations in Dry Valley.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Mining will progressively remove forage from 787 acres, of which about 740 acres are rangeland with an estimated average annual production of about 1,000 pounds of usable forage per acre (air dry weight). During the life of the mine about 400 AUM's, valued at $2,360 annually, will be lost on all or part of the site; some additional forage may be lost on adjacent lands. Because mining will progress alternately northward and southward, grazing will probably be eliminated on most of the site during the entire life of the mine.

2. SOCIOECONOMIC DEVELOPMENT

The proposed Dry Valley mine will employ about 230 people when fully operational. The social and economic impacts at the site are minimal and by themselves are not significant, but in conjunction with other proposed activities, they will have significant regional socioeconomic impacts, as described in part 1, chapter III.

3. TRANSPORTATION AND UTILITIES SYSTEMS

Impacts will be similar to those described in part 3, chapter III.

4. RECREATION RESOURCES

The proposed mining will decrease opportunities for deer and blue grouse hunting.

The mine and attendant operations will reduce the scenic quality of the area with consequent reduction of the quality of the recreational experience of campers and picnickers.

5. ARCHEOLOGIC AND HISTORIC VALUES

It is not known whether archeologic sites will be impacted. No complete survey of the leasehold have been made.

6. AESTHETICS

The somewhat open character of the site and its location on a sidehill in the foreground viewing zone place it in open view; visual impacts will be high.

CHAPTER IV
MITIGATING MEASURES

State and Federal laws, regulations, and administrative policies that require mitigation or reclamation of mining impacts, and requirements of the surface-management agencies and the USGS District Mining Supervisor are discussed in detail in Part 1, Chapter IV. These shall be required at this site. Other additional mitigating measures as discussed in Part 1, Chapter IV, shall also be required as appropriate.

FMC proposes to backfill those pits that are visible from the principal road entering Dry Valley, and to grade and shape the remaining dumps, to blend with the natural topography. Maximum slopes will be 3:1. In addition, the company plans to reclaim disturbed areas into stable slopes. Topsoil will be stockpiled and later spread over disturbed areas. It will be cultivated on the contour to conserve moisture and inhibit erosion. Revegetation with fast-growing grass species will reduce erosion. Interceptor ditches totalling 27,000 feet will be used above affected areas to control erosion and siltation. Culverts totalling about 5,500 feet in length are proposed for areas where the present channels are to be covered or are very close to waste-disposal areas. French drains will be constructed where seeps are encountered in the waste-disposal areas, and the flows will be directed through culverts to protect against slope failures. Dump faces and sediment-retention structures will be designed to minimize offsite impacts. A stock pond will be relocated and stocked with fish. The company plans to control dust at the mine by watering roads and active areas. Dumps will be revegetated, using topsoil where possible, and haul roads and service areas will be revegetated on completion of mining. The company proposes to make employees and equipment available for fighting wildfires during the operation of the mine. Roads, pits, and other areas hazardous to livestock will be fenced.

The following mitigating measures should be imposed as special stipulations.

Waste dumps should not be placed over stream courses nor in areas of ground-water recharge or discharge if other sites are feasible. Additional hydrologic data should be collected prior to construction activities to insure adequate design of water-control structures. An alternative to the route through or adjacent to the elk calving ground in Dry Valley should be developed.

CHAPTER V
ADVERSE EFFECTS THAT CANNOT BE AVOIDED

Changes in the land surface at either level of mining are unavoidable (fig. 7-5). Of the total area disturbed, 59 acres will not be reclaimed. More than a mile of stream channel will be permanently buried, and the flow directed through drainage structures.

Soils will be disturbed on 787 acres (605 acres by 2000 A. D. under the revised production schedule). The 250 acres of disturbed farmlands will not be suitable for agriculture even after reclamation.

Buffer zones will be relatively ineffective because of the proximity of mining to Dry Valley Creek. A moderate increase in sediment in the creek probably cannot be avoided during mining.

Vegetation will be removed from 787 acres, with about 300 acres cleared at any one time during most of the life of the mine. Annual forage production on 728 acres of reclaimed land will probably not exceed 500 pounds per acre, air dry weight--about half the present value. Production on 59 acres of unreclaimed ponds and highwall will be lost.

About 25 deer will be lost, and migration routes for a significant number of deer will be blocked. Deer blocked on existing migration routes will probably seek new winter ranges, which could lead to overgrazing of adjacent winter range and thus to a reduction in deer population. A calving ground for about 30 elk will be altered, and elk and deer will be displaced from summer range. About 60 elk may ultimately be lost. These displacements will reduce herds in the area through increased competition for food and cover.

A small fish population in Dry Valley will be further reduced.

Sage-grouse population will probably be depleted owing to habitat alteration and human disturbance, and mourning-dove and rabbit populations will probably be significantly reduced. Beaver habitat will be disturbed, displacing an unknown number of animals. Prey habitat for raptors will be reduced as well as habitat for sandhill cranes.

Forage will ultimately be removed from 740 acres of rangeland. Average annual production of usable forage on about 728 acres of reclaimed land will probably not exceed 500 pounds per acre, air dry weight; forage on 59 unreclaimed acres will be lost.

There will be no impacts on archeologic sites. The site has been recommended for clearance as required under Executive Order 11593.

Recreational opportunities for hunting and other outdoor activities, including ORV use, will be reduced.

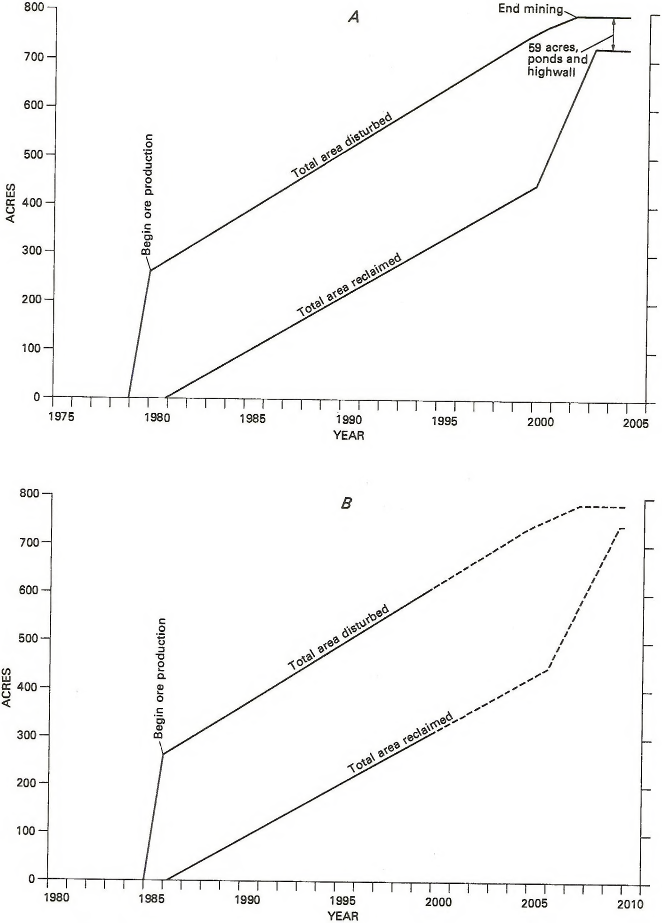

Figure 7-5.—Land disturbance and reclamation, Dry Valley site. *A*, Based on mining plan as submitted for approval. *B*, Based on revised level of mining.

CHAPTER VI
SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

Based upon mining as originally proposed, 38 million short tons of phosphate rock will be removed from the site for processing into elemental phosphorus. In mining, soils will be disturbed on 787 acres, and 70 million cubic yards of overburden and bedrock will be moved.

During mining, dewatering of the pits will lower ground-water levels locally, with consequent reduction in flow of nearby springs creating local changes in vegetative cover. Dewatering of the mine pits will increase flows and may slightly reduce water quality in Dry Valley Creek during the mining season. There will be some short-term lowering of air quality from dust and vehicle emissions.

During mining, vegetation will be progressively removed from 787 acres; forage production of 800 to 2,000 pounds per acre, air dry weight, will be lost on about 300 acres at any given time. Wildlife populations will be disrupted; about 60 elk and 25 deer may be displaced to adjacent ranges. Migration routes for about 100 deer will be disturbed. Sage grouse will be displaced from critical winter range. On the minesite, about 400 AUM's of forage, valued at $2,360 annually, will be lost during mining, because most of the site will not be available for grazing. The aesthetics of the area and the recreation resources will be lowered during mining.

Long-term productivity of the area will be reduced. Vegetation on dumps and other areas is not likely to recover to pre-mining levels. Annual forage production on 728 acres of reclaimed land will probably not exceed 400 to 1,000 pounds per acre, air dry weight--about half the present value. Production on 59 acres of unreclaimed ponds and highwall will be lost. Some long-term reduction in elk and deer herds will result from competition on nearby ranges from displaced animals. Average annual production of usable forage on 728 reclaimed acres will probably not exceed 500 to 700 pounds per acre, air dry weight; production on 59 unreclaimed acres, will be virtually zero. On the entire site, average production of usable forage of about 200 AUM's, valued at $1,180, will be lost annually. The loss of soil, vegetation, and productivity of about 110 acres for the proposed beneficiation plant will be long term. The original condition of the land and its aesthetic quality will not be fully renewable after operations. The effect of the proposed plant and settling ponds will have long-term effect on the aesthetic character of the area by conflicting with the natural remoteness and contrasting with natural visual characteristics of the area.

At the more probable level of mining, as shown in table 1-1a, 28 million tons will be mined by 2000 A. D., and 605 acres will be disturbed.

CHAPTER VII
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Based upon the proposed level of mining, about 38 million short tons of phosphate rock will be mined and processed. Along with this, 0.91 million short tons of fluorine, 30,000 short tons of vanadium, 4,200 short tons of uranium, and 38,000 short tons of rare earths will be removed. Only the phosphate and vanadium will be recovered. This is irretrievable. The landscape change through creation of pits and dumps is largely irreversible. The mixing of soils and attendant loss or reduction of productivity on 787 acres is irreversible; the commitment of about 110 acres to a beneficiation plant and settling ponds is largely irretrievable. Loss of wildlife and fisheries, to the extent that they cannot successfully relocate, is also irretrievable. The remote, undeveloped character of Dry Valley will be irreversibly and irretrievably committed to the intrusion of mining-related changes.

The mining and reclamation to the year 2000, will require 12 million gallons of diesel fuel, 1.5 million gallons of gasoline, and undetermined amounts of lubricants, explosives, electricity, and construction materials.

The proposed plant to beneficiate the ore will require about 5,000 tons of steel, 9,000 cubic yards of concrete, 15,000 tons of aggregate, and 2,000 tons of cement. Beneficiating the ore will require about 300 million kilowatt hours of electricity, 150,000 gallons of gasoline and, if wet processing is used, 52,000 acre-feet of water. Transportation of the beneficiated rock to the FMC plant in Pocatello, Idaho will require 9.1 million gallons of diesel fuel.

Processing the phosphate rock into elemental phosphorus at the FMC plant in Pocatello will require about 39 billion kilowatt hours of electricity, 150,000 gallons of gasoline, 4.6 million tons of coke, 2.7 million tons of silica, 110,000 tons of carbon electrodes, and 49,000 acre-feet of water.

About 5,300 tons of ferrophosphate slag from FMC is processed annually by Kerr-McGee at Soda Springs for vanadium recovery. At this rate, 110,000 tons of limestone and 15,800 tons each of salt and soda ash will be required, along with an undetermined, but substantial, amount of energy. About three-fourths of the ferrophosphate slag produced by FMC is shipped to east-coast processors for vanadium recovery. Resource requirements for this recovery have not been determined.

At the more probable level of mining, as shown in table 1-1a, 28 million tons will be mined by 2000 A.D. with a proportionate reduction in commitment of other resources.

CHAPTER VIII
ALTERNATIVES

The general administrative options available to the Secretary of the Interior are discussed in part 1. FMC has no proposals other than Dry Valley. If that proposal were rejected, FMC would probably continue to acquire ore for processing from another company, as it now does from Simplot or acquire new leases. Impacts would thus be transferred to another site.

FMC proposes to return about half the waste to the pits. The alternative of replacing all the waste would probably eliminate the dumps, and the pits would be completely filled. Onsite haul equipment is not specified. The proposed pits are within a half mile of the existing and proposed railroads: hauling directly from pits to tipple would probably have less impact than any alternative.

PART 8

INTERNATIONAL MINERALS AND CHEMICAL CORPORATION

HUSKY NO. 1 MINING PLAN

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PART 8
INTERNATIONAL MINERALS AND CHEMICAL CORPORATION

International Minerals and Chemical Corporation (IMC) is a leading producer of agricultural fertilizer. It is also the nation's largest producer of phosphate rock with approximately 21 percent of U.S. production and 9 percent of world production. In 1974, it processed 12 million tons of phosphate rock from Florida, which is about the limit permitted by these reserves. IMC's Florida mining operations will start to decline in about 10 years, hence new ore sources are being justified.

The proposed Husky No. 1 mine will be IMC's initial production from several Federal phosphate leases in southeast Idaho. The mine will produce about 51.5 million tons of ore over an 18-year period starting in 1978. The company has no plans to produce elemental phosphorous or phosphate fertilizer in this area. A plant site for beneficiation and calcining has not yet been selected, but it will probably be near Soda Springs.

On June 7, 1977, Becker Industries Corporation acquired the properties and leases described in this part from IMC. At the present time, Becker intends generally to follow the IMC mining and reclamation plan described here; however, Becker will most likely integrate their plans for developing the Husky No. 1 mine closely with their South Maybe Canyon mine, described in part 5. Such an integration would result in more efficient mining in terms of backfilling, etc., at both mine sites, as well as less total environmental impact.

CHAPTER I
DESCRIPTION OF THE PROPOSED ACTION

The proposed Husky No. 1 mine is in southern Caribou County approximately 16 air miles east of Soda Springs. The project involves Federal Phosphate Lease I-05549 (fig. 8-1) containing 864.35 acres and a proposed Forest Service special-use permit for areas needed for construction of a railroad, roads, dumps, and power corridors outside the lease. This permit, which has not been applied for, straddles Dry Ridge between Dry Valley on the west and Diamond Creek on the east. All of this area is in the Caribou National Forest. The ore beds to be mined are a continuation of those currently mined by Beker at its Maybe Canyon mine 4 miles to the north. The proposed mine will be the first within the leasehold. Exploratory drilling and trenching and two engineering feasibility studies have been completed.

The mining plan as submitted is conceptual and does not contain sufficient engineering details for final consideration of approval or disapproval under Federal Regulation 30 CFR 231. The following details are lacking at this time and will be required.

1. Depending on the initial opening of the mine from the south or north end, a firm location of the waste dump site or sites is required.

2. Design details, cross sections and longitudinal sections of the dumps are needed.

3. Forest Service special land use permits are required but application to that agency has not been made. The permits with stipulations should be a part of the mining plan.

4. Shop warehouse, pit water control pumping unit with piping and fuel storage sites are not located.

5. Engineering details and site location of siltation collection downstream from the north waste area or other sites are required.

6. Geologic cross sections with proposed pit outlines at 500-foot intervals along the length of the pit are needed.

7. Details of the diversion of Maybe Canyon Creek along the west boundary of the north dump are lacking.

8. Details of interceptor ditches to be constructed along the pit highwall are missing.

9. Drainage water, collected in siltation ponds and in the final unfilled pit, should be analysed before release into Diamond or Maybe Canyon Creek.

The following information has been extracted from the mining plan submitted by the company to the Conservation Division, U. S. Geo-

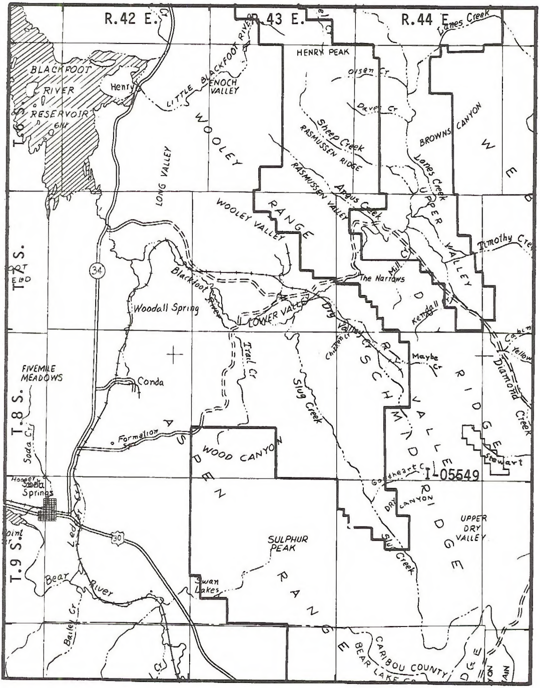

Figure 8-1.--Location of Federal phosphate lease for the proposed Husky No. 1 mine.

logical Survey, Pocatello, Idaho; a preliminary environmental assessment prepared by Dames and Moore; a completed environmental report by Dames and Moore; and interviews with company representatives. The plan and preliminary environmental assessment were submitted to the U. S. Geological Survey on August 5, 1974. The completed report was submitted on December 13, 1974.

A. PROPOSED MINING OPERATIONS

Phosphate ore will be mined by open-pit methods along a 14,000-foot length (fig. 8-2). Ore will be moved by conveyor and truck from the minesite, and then transported by rail to a proposed beneficiating plant in the Soda Springs area. Proposed production is nearly 3 million tons per year for 18 years, for a total production of 51.5 million tons; at a stripping ratio of 4.57:1, waste rock will total about 305 million cubic yards. Ore will be mined during the summer; chert and limestone will be stripped primarily during the winter. Power shovels and trucks will be used for removal of overburden, self-loading scrapers and dozers for removal of ore, and trucks or scrapers for ore haulage to a conveyor loading facility.

Mining will take place in five phases (fig. 8-3).

Phase-1 mining will produce 10.3 million tons of ore during the first 4 years. Mining will start at the northwest end of the proposed pit, where the stripping ratio is greatest. All the waste from Phase 1 and part of waste from Phase 2 will go to the Maybe Canyon dump. If the alternate dump site in Stewart Canyon is chosen, mining could begin in the south.

Early in the fifth year, IMC will start backfilling waste into the Phase-1 pit. When the pit is filled, the secondary ore conveyor will be installed to move ore out of the pit from a common collection point to the primary ore conveyor.

Phase 2 will produce 12.9 million tons of ore; Phase 3 will produce 6.2 million tons. At the end of Phase 3, the entire deposit will have been prestripped down to ore level.

Phase 4 will produce 10.6 million tons. Phase-2 and -3 pits will be backfilled.

Phase 5 will produce 11.5 million tons. Waste will be moved into the Phase-2, -3, -4, and -5 areas for final contour grading, but the Phase-5 pit will not be backfilled.

The ore will be removed from the pit by haul truck or conveyor belt to a central loading point, where a conveyor belt will deliver it to a stockpile and a rail loadout system in Dry Valley. There are no provisions for stockpiling marginal ore. Company officials state IMC will mine all the weathered rock within stripping limits. Some weathered rock will be left; near the south end some unweathered rock will be mined. The environment report states that underground mining is unfeasible because of excessive cost and faulting of the ore body.

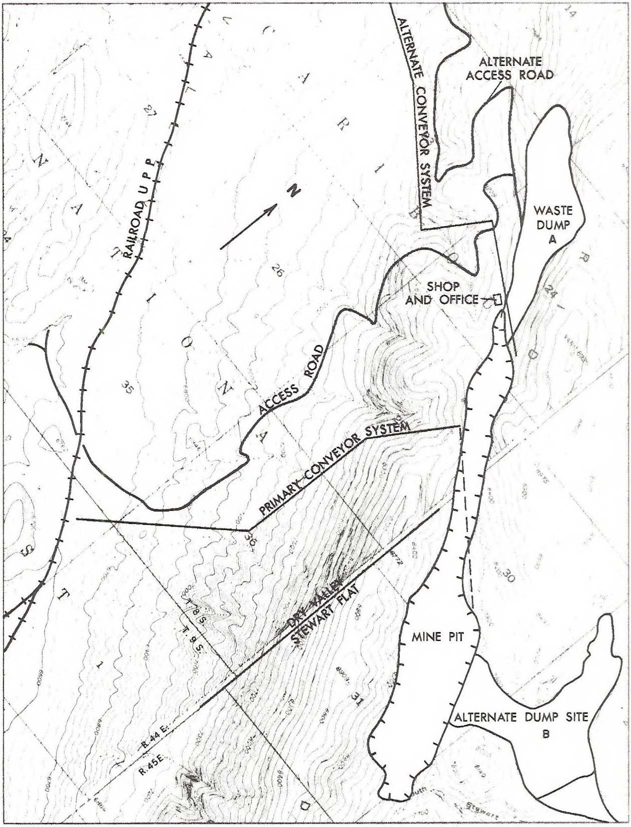

Figure 8-2.--Mining plan proposed for the Husky No. 1 site.

B. RECLAMATION

The mine plan and environmental report state that when pit space is sufficient, waste will be backfilled into the preceding mined panel.

IMC proposes to construct a waste dump in Maybe Canyon just north of the leasehold (fig. 8-3). The dump will cover 139 acres and contain 74 million tons of waste. To prevent siltation of Maybe Creek, a siltation pond will be built at the north end of the dump. A ditch across the downstream dump face will direct runoff to the pond. Early in the fifth year of mining, the waste area will be completed, contoured, and revegetated. According to IMC, topsoil is too thin to permit stockpiling separately from waste.

After completion of the waste dump, overburden and waste shale will be backfilled into the mined-out pit as mining progresses. The backfilled surface will be contoured and shaped to control drainage. Three siltation ponds will remain in the south part of the reclaimed pit areas to protect drainage eastward into Diamond Creek.

The plan also specifies need for a siltation pond downstream in Maybe Canyon. Construction detail and site of the pond are not given, but the proximity to Beker's South Maybe operation would require coordination with Beker.

The environmental report proposes an alternate dump site near the south end of the ore deposit in Stewart Canyon. A siltation pond constructed in that canyon will protect the drainage into Diamond Creek.

Discussion with company representatives disclosed that the mine plan is only conceptual; the final plan may require part, at least, of both the proposed Maybe Canyon and Stewart Canyon sites for waste disposal.

Waste rock will be placed sequentially at prepared dump sites at slopes 2:1 or flatter. Shallow diversion channels of uniform grades of 5 percent or less will control runoff on the dump faces. Runoff will be diverted into sedimentation ponds.

Revegetation of disturbed land will involve seed-bed preparation, fertilization, and seeding with adaptable plant species. Where response to initial seeding is poor, spring reseeding will be done.

C. SURFACE FACILITIES

In addition to access roads, conveyor systems, and railroad-loadout facilities, planned facilities include a fully equipped 15,360-square-foot shop and office building, a warehouse, an auxiliary power plant, underground storage tanks for fuel and water, pumping equipment and piping, and an in-pit road system leading to waste dump and ore conveyor. The location of these facilities or the location and size of power transmission facilities are not discussed in the mine plan.

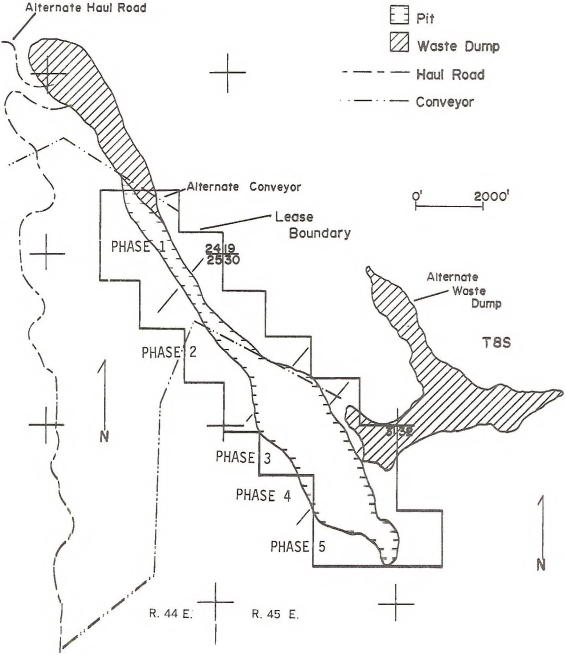

Figure 8-3.--Mining sequence proposed for the Husky No. 1 mine.

According to the environmental report, access roads and power transmission lines will follow the railway and conveyor-belt corridors.

The primary ore conveyor will be 42 inches wide and 9,538 feet long in three lengths. It will move ore downhill from minesite to the stockpile and railroad loadout facility in Dry Valley. No power is required to move this 1,000 to 1,500-ton-per-hour conveyor once the loaded system is in motion. Power generated by the loaded conveyor will operate the in-pit ore conveyor. A secondary in-pit conveyor 5,000 feet long with a lift of 500 feet, will supplement in-pit truck haulage to the primary conveyor.

A construction and maintenance road will service the conveyor. The primary conveyor will feed a stockpiling conveyor, which is designed to build a radial pile of 30,000 tons of ore with 18,000 tons of live storage. Dozer-spreading can provide a total stockpile of 100,000 tons. Conveyors below the stockpile will transfer material at a rate of 1,500 tons per hour into railcars. These cars, in strings of 25, can be loaded automatically and continuously. Rail accommodations include storage for 120 empty cars and 120 loaded cars and a runaround track.

A 30-foot wide gravel road will provide the main access from the rail loadout in Dry Valley to the mine.

The environmental assessment proposes two alternative routes for mine access, conveyor movement of ore from the mine, and location of the railroad loadout facilities in Dry Valley. Alternative A considers an alignment of the rail and conveyor-belt systems on the east side of Dry Valley. This route shortens new rail construction, but approximately 3,000 feet of additional conveyor belt would be required. Alternative B goes up the west side of Dry Valley.

CHAPTER II
DESCRIPTION OF THE EXISTING ENVIRONMENT

A. NATURAL ENVIRONMENT

1. CLIMATE

The general climate of the area is described in Part 1. Temperatures at the minesite average 5^{o} cooler than those in Conda. Growing seasons are short, probably less than 60 days. Freezing temperatures at this elevation could be expected on any date. Data obtained by the Idaho Bureau of Mines and Geology immediately west of the proposed mine site indicate that the annual moisture from precipitation and drifting snow at the minesite probably exceeds 35 inches. Snowdrifts are deep on the steep eastern slopes of Dry Ridge at the site and may constitute an avalanche hazard.

2. LAND RESOURCES

a. Land Surface

The proposed mine is near the top of Dry Ridge. It extends northwest from the upper part of South Stewart Canyon about 2.8 miles to the head of Maybe Canyon. Much of the area is above 8,000 feet elevation, and the relief between Dry Ridge and Dry Valley is about 2,300 feet.

b. Geology and Mineral Resources

The Meade Peak is about 200 feet thick, and the total thickness of the combined upper and lower phosphate zones is about 45 feet. The ore beds strike N. 20^{o}-40^{o} W. and generally dip east but locally may be overturned. The Meade Peak is cut out by a fault at the north end of the minesite and has minor folds and faults at the south end. Production of 51.5 million short tons of phosphate is planned. Estimates of the total resources of some significant elements in the phosphate ore are: 1.2 million short tons of fluorine, 5,700 short tons of uranium, 41,000 short tons of vanadium, and 52,000 short tons of rare earths.

c. Soils

The distribution of landtypes is shown in figure 8-4; their characteristics are shown in table 8-1. There are 410 acres of Landtype 2, 80 acres of Landtype 41, 20 acres of Landtype 41-1, 314 acres of Landtype 54 and 40 acres of Landtype 56-1 on the leasehold. These landtypes are described in Chapter II of parts 4.1 and 5.1. About half of the pit area and about 20 to 35 percent of the dump area have soils with moderate to high suitability for topsoil.

3. WATER RESOURCES

a. Water Supply

1. Surface Water

Almost all the proposed minesite drains into Stewart Canyon, and then into upper Diamond Creek. An average of 2,000 acre-feet or more annually could drain across the mining area. Distribution of water yield between surface and ground water and flow characteristics at the mine are not known, but Stewart Canyon maintains a perennial flow just below the minesite.

Nearly 20 measurements of flow by U.S. Forest Service in 1974 and 1975 indicate that about 3,500 acre-feet, equivalent to 22 inches over the area, flowed at the mouth of Stewart Canyon between July 1974 and June 1975. Comparisons with the flow of Blackfoot River indicate that the maximum flow in Stewart Canyon during this period could have been 30 cfs or higher. A large spring in a tributary of Stewart Canyon helps maintain relatively high base flows at the mouth of Stewart Canyon.

2. Ground Water

Drill-hole data indicate that ground water occurs in the Phosphoria in several places at the site at an altitude of about 8200 feet. Although data are not sufficient to determine ground-water gradient, it probably corresponds generally to the topography. Some drill holes were wet to depths of 600 to 700 feet, which is considerably more than the thickness of the Meade Peak Member. The Wells Formation apparently is dry at this site.

The extent of the ground-water system, or systems, from which the water is supplied is not known, but a considerable part of the proposed pit will be below the 8,200-foot altitude where the water was encountered. Some of the drill holes sustained yields of as much as 75 gpm, which suggests that a considerable quantity of water may have to be drained during mining.

b. Water Quality

Some recent analytical data are available for water from Maybe and Stewart Creeks, which drain part of the site. Ranges in values for selected parameters measured during low-flow conditions (August to October 1974) are shown below. In general, 11 or 12 measurements were made for each parameter.

	Maybe Creek at Caribou National Forest boundary	Stewart Creek above Diamond Creek
	(Range in values)	
Discharge (cfs)	0.23-0.98	2.4-3.8
Dissolved solids (ppm)	230-250	200-425
Suspended sediments (ppm)	0-21	0-91
pH	7.4, 8.1 (two measurements)	7.1 (one value)
Total Kjeldahl nitrogen as N(ppm)	1.1-5.8	0.6-11
Total inorganic phosphorus as P(ppm)	0.01-0.25	0.06-0.24

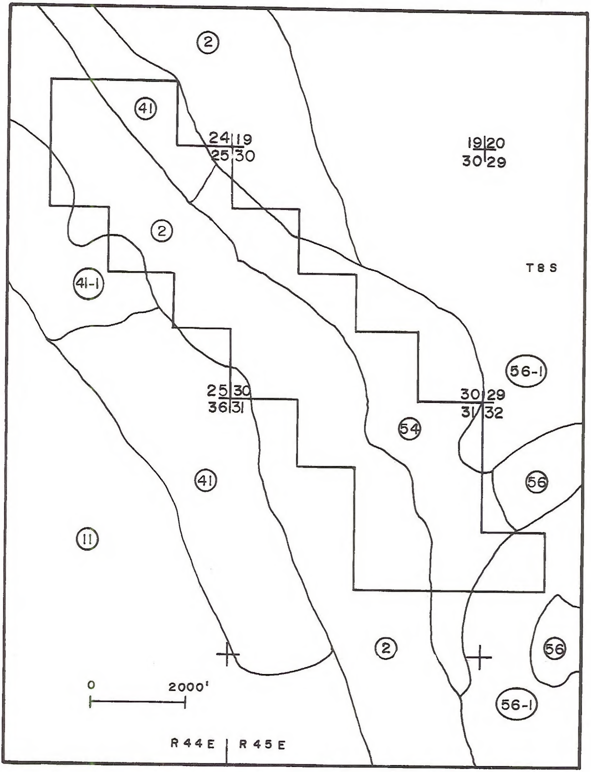

Figure 8-4.--Landtypes near the Husky No. 1 site.

Table 8-1.--Physical characteristics of soils at Husky No. 1 minesite. VL = very low, L = low, M = moderate, H = high, VH = very high

Landtype	Soil families	Percent of area	Erosion in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road construction hazards	Slope range, in percent	Revegetation potential
				Depth, in inches	Suitability					
2	Argic Cryoborolls, loamy-skeletal, mixed	45	.051	10	H	4.5	VL	H	45-60	VL
	Mollic Cryoboralfs, fine-loamy, mixed	20	.061	6	M	7.2	L	M	25-35	L
	Pachic Cryoborolls, fine-loamy, mixed	14	.066	12	H	6.0	VL	H	35-45	L
	Typic Cryorthents, fine-loamy, mixed	15	.012	6	M	4.3	VL	L	0-10	L
	Lithic Cryoborolls, loamy-skeletal, mixed	5	.172	6	L	3.4	M	VH	50-60	VL
11	Cryic Pachic Paleoborolls, fine-silty, mixed		.004	12	H	9.6	VL	VL	10-20	VH
	Argic Pachic Cryoborolls, fine-silty, mixed		.017	10	H	9.6	VL	M	30-40	M
41	Calcic Pachic Cryoborolls, loamy-skeletal, mixed	55	.075	10	M	3.9	L	H	30-70	VL
	Argic Pachic Cryoborolls, loamy-skeletal, mixed	20	.032	10	H	5.7	L	H	20-50	L
	Lithic Cryoborolls, loamy-skeletal, mixed	15	.023	4	L	3.4	VL	M	20-30	VL
	Argic Cryoborolls, loamy-skeletal, mixed	10	.045	8	L	4.5	L	H	40-60	L

Table 8-1.--Physical characteristics of soils at Husky No. 1 minesite--Continued

Landtype	Soil families	Percent of area	Erosion in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road construction hazards	Slope range, in percent	Revegetation potential
				Depth, in inches	Suitability					
41-1	Calcic Cryoborolls, loamy-skeletal, mixed	75	.041	6	L	4.6	M	H	40-60	VL
	Lithic Cryoborolls, loamy-skeletal, mixed	15	.052	6	M	3.4	L	VH	20-30	VL
	Mollic Cryoboralfs, loamy-skeletal, mixed	5	.017	8	L	8.8	L	M	50-60	M
	Argic Pachic Cryoborolls, loamy-skeletal, mixed	5	.010	12	M	5.7	M	M	35-45	H
54	Mollic Cryoboralfs, loamy-skeletal, mixed	45	.061	6	L	8.8	L	M	35-50	H
	Mollic Cryoboralfs, fine-loamy, mixed	30	.018	6	L	7.2	L	M	40-55	M
	Lithic Cryoborolls, loamy-skeletal, mixed	20	.012	4	M	3.4	VL	H	15-35	L
	Typic Cryorthents, loamy-skeletal, mixed	5	.004	0	L	5.2	M	H	30-50	M

Table 8-1.--Physical characteristics of soils at Husky No. 1 minesite--Continued

Landtype	Soil families	Percent of area	Erosion in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road construction hazards	Slope range, in percent	Revegetation potential
				Depth, in inches	Suitability					
56	Argic Cryoborolls, loamy-skeletal, mixed	40	.068	8	M	4.5	L	M	50-65	M
	Calcic Cryoborolls, loamy-skeletal, mixed	40	.143	8	L	4.6	M	M	60-70	L
	Mollic Cryoboralfs, fine-loamy, mixed	20	.063	8	H	7.2	L	M	30-50	L
56-1	Typic Cryorthents, loamy-skeletal, mixed	60	.019	4	L	5.2	L	H	25-60	M
	Argic Cryoborolls, fine-loamy, mixed	35	.017	8	M	6.0	M	H	25-60	M
	Lithic Cryoborolls, loamy-skeletal, mixed	5	.111	4	L	3.4	L	M	50-60	L

Data for the same sites, obtained during spring and early summer 1975, are shown below. These include data for snowmelt runoff.

	Maybe Creek at National Forest boundary	Stewart Creek above Diamond Creek
No. of samples	9	11
Dates of collection	March 18-April 23, 1975	May 21-July 9, 1975
Discharge (cfs)	4.7 (one value)	3.7-12.2 (5 values)
Dissolved solids (ppm)	230-255	190-215
Suspended sediments (ppm)	21-20,000	3-860
pH	8.2-8.9 (8 values)	7.00-8.10 (5 values)
Total Kjeldahl nitrogen as N(ppm)	1.9-9.8	1.2-2.5
Total inorganic phosphorus as P(ppm)	0.16-1.4	0.05-0.35 (9 values)

A few high suspended-sediment concentrations (maximum observed = 20,000 ppm) occurred in Maybe Creek because a sediment pond failed at an existing mine. The one high concentration of 860 ppm in Stewart Creek may have resulted from exploration activities prior to mining. The average of the other measurements is 41 ppm.

Additional data on water temperature, dissolved oxygen, suspended solids, pH, total phosphorus, fluoride, and calcium in waters of the Dry Valley region obtained by Beker Industries, are given in Part 5.

One measurement for Maybe Creek and two measurements for Stewart Creek were made for each of several trace elements. Total concentrations for unfiltered and acidified samples are shown below:

	Maybe Creek	Stewart Creek	
	August 26, 1974	August 27, 1974	May 28, 1975
	(micrograms per litre)		
Arsenic, cadmium, selemium	0 [1]	0	0
Copper	5	6	8
Chromium	2	2	2
Vanadium	0	0	20
Zinc	3	2	68

[1] Concentrations reported as 0 are less than detectable amounts.

Water quality data from July 19 to October 5, 1974, for Diamond, Stewart and South Stewart Creeks, as reported in an environmental assessment prepared by IMC indicate that some damage to stream bank vegetative cover and bank stability on Stewart Creek by cattle and by the construction of exploration drilling pads, with resultant sediment to the stream. The assessment also indicates that silt present in Diamond Creek could, in part, be attributed to beaver influence.

Substrate analysis for the Stewart Canyon section of Diamond Creek showed that, by volume, 8 to 23 percent of the material was composed of particles less than 1 mm (millimetre) in diameter while 42 to 78 percent had particles which were greater than 8.0 mm in diameter.

Salient features shown by the IMC data include the following: non-filterable solids (suspended solids) reported for four different stations (Diamond and Stewart Creeks) range from 0 to 153.2 ppm. The assessment indicates that dissolved oxygen in the streams is generally 100 percent of saturation. The nutrients, phosphorus and nitrate, in the stream waters are appreciable, with total inorganic phosphorus ranging from 0.34 to 1.1 ppm as PO_4 and nitrate ranging from 4.4 to 13 ppm as NO_3. With respect to pH and other constituents, the water quality appears typical of other stream water sources in the study area.

4. AIR RESOURCES

The present air quality in the vicinity of the proposed minesite is good. Minor amounts of dust and particulates occur along roads in the vicinity of the leasehold, as a result of vehicular traffic, along unpaved roads.

5. VEGETATION

There are about 780 acres of conifer-aspen and about 85 acres of sagebrush-grass on the leasehold. Forage production ranges from 600 to 1,800 pounds per acre air dry weight. Timber volumes in the conifer-aspen average slightly less than 6,000 board feet per acre. No commercial timber sales have been made to date.

6. WILDLIFE

The Forest Service estimates that 25 to 50 elk utilize the aspen/mixed brush community on the west slope of Dry Ridge for calving during May and June. This community also provides limited winter range with sufficient browse materials which remain uncovered by snow, and adequate shelter from winds and stormy weather. Elk also have been observed wintering along Dry Ridge in the general area of the Maybe Canyon mine, 4 miles north, during periods of relatively shallow snow. Deer are common throughout the area except during winter; as many as 25 may use the area. Moose utilize the willow-sedge/wet meadow habitat in the Diamond Creek and Stewart Canyon drainage. Evidence of browsing and the presence of tracks indicates that they have been relying on this vegetative association as an important food source. Their summer range extends to the minesite.

Beaver dams indicate that beaver are present in the upper portion of Diamond Creek. Suitable habitat is currently recovering from a high beaver population. Maybe Canyon has remnant dams and habitat suitable for about two beaver colonies. Waterfowl along the stream in Maybe Canyon include gadwall, widgeon, mallard, blue and greenwinged teal, and American coot.

The blue, ruffed, and sage grouse inhabit several of the vegetative communities near the site. The blue and ruffed grouse inhabit both the Dry Valley and Diamond Creek watersheds. The sage grouse inhabit the sagebrush-grass areas in the spring, summer, and fall. During the winter, several sage grouse have been observed on the higher slopes of Dry Ridge. Raptors use the site for both nesting and hunting.

No threatened or endangered species have been observed on the site.

7. FISHERIES

Stewart Creek has a steep gradient, is spring-fed, and supports a very low cutthroat trout population. Fishery values are low but the stream probably contributes small numbers of cutthroat trout to Diamond Creek and the Blackfoot River. Water in Stewart Creek is cooler during the summer than that in Diamond Creek and the cooler water entering Diamond Creek is favorable to the fisheries in Diamond Creek. Trout enter Stewart Creek in the fall when temperatures equalize. Also, the water in Stewart Creek is of excellent quality. A wood barrier in lower Stewart Creek possibly forms a partial fish passage block to cutthroat trout moving upstream.

South Fork Stewart Creek, a small, intermittent stream draining the southern portion of the area, has a low fishery value.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Two livestock operations use the forage produced on the lease and adjacent areas. From June 21 to September 15, 2,245 sheep are permitted to use the National Forest lands. Forage consumed from these federal lands amounts to approximately 5,920 sheep months of feed valued at $9,240 annually. The National Forest Lands are used in conjunction with the operators' private and leased lands, and constitute a significant part of the operations. The leasehold is about 4 percent of the total allotment.

2. SOCIOECONOMIC DEVELOPMENT

The leasehold is presently open range.

3. TRANSPORTATION AND UTILITIES SYSTEMS

Primitive access roads and about 2.3 miles of the Maybe Canyon-Stewart Canyon road are on the leasehold. No utilities systems are on the leasehold.

4. RECREATION RESOURCES

The Maybe Canyon-Stewart Canyon Road is part of a loop route to the Diamond Creek and Blackfoot River areas, and pleasure driving is popular. The ridge area along the leasehold is popular as a big game and bird hunting area. Fishing the valley streams near the minesite attracts many people to the area. Snowmobiling, hiking, horseback riding, and motorcycling are growing in popularity, but are primarily restricted to the road corridors because of the steep topography.

5. ARCHEOLOGIC AND HISTORIC VALUES

A two-day reconnaissance examination by Evan DeBloois, Regional Archeologist for the Forest Service, uncovered no artifacts or evidences of prehistoric cultures on the leasehold. There are no recognized historic sites on the area.

6. AESTHETICS

The visual variety class of the area is rated moderate. Although the site is in the middleground viewing zone of the Diamond Creek and Slug Creek Roads, much of it is hidden by the surrounding mountain ridges. The Maybe Canyon-Stewart Canyon road crosses the site, and it is in view of Dry Valley road.

CHAPTER III
ENVIRONMENTAL IMPACTS

The impacts described in this chapter are based upon the mining plan as originally submitted. It is now highly unlikely that this mining will occur.

A. NATURAL ENVIRONMENT

1. LAND RESOURCES

a. Land Surface

Mining will create 383 acres of pit and 139 acres of dump. The pits will be partially backfilled. An additional 89 acres will be modified by roads, buildings, and other facilities associated with the mining.

The open pit will be 14,000 feet long, an average of 1,200 feet wide, and up to 800 feet deep. Waste rock totalling 170 million cubic yards will be placed in smooth dumps having a low profile.

b. Geology and Mineral Resources

Mining will remove 51.5 million short tons of phosphate rock, which will include 1.2 million short tons of fluorine, 41,000 short tons of vanadium, 5,700 short tons of uranium, and 52,000 short tons of rare earths. Only the phosphate will be recovered from the ore.

c. Soils

Mining will disturb soils on 611 acres of the 864 acres on the leasehold, typically at a rate of about 40 acres per year.

2. WATER RESOURCES

a. Water Supply

1. Surface Water

Overland flows will increase significantly. The amount cannot be quantified with existing data.

2. Ground Water

Drainage of ground water by mining could remove soil moisture that sustains vegetation on Dry Ridge. It could also reduce the groundwater discharge in the upper reaches of Stewart Canyon Creek, which is perennial below an altitude of about 7,500 feet.

b. Water Quality

Sediment loads will increase significantly. If alternate dump A is used, the Forest Service estimates that sediment loads in the headwaters of Maybe Creek could increase to as much as 10 to 20 times present loads during mining and remain 6 to 12 times present loads after mining. The impact will be high. If alternate dump B is selected, the sediment loads in Maybe Creek will be much less, but loads in the headwaters of Stewart Creek could increase during mining to 35 to 60 times present loads and remain 25 to 45 times present loads after mining. Sediment loads will be very high. This large increase in sediment production will increase sediment in Diamond Creek below South Fork of Stewart Creek to Timber Creek during mining by an estimated 9 to 18 times and 7 to 15 times after mining. Again, sediment loads will be high. During mining, sediment in Diamond Creek below Timber Creek will increase about 2 to 4 times and after mining 1½ to 2½ times present levels with low to moderate loads. If alternate dump A is selected, these loads will be greatly reduced.

The south fork of Stewart Creek from the headwaters to the confluence with Diamond Creek will receive sediment from a portion of the mine pit. These sediment increases are estimated to be 3½ to 7 times the present conditions. The present conditions are considered to be low; with the disturbance from mining the rates would be considered moderate to high.

The increase in sediment in the Blackfoot River from Diamond Creek to the Blackfoot Narrows from dump A is estimated by the Forest Service at about 1½ to 2½ times the present load with low to moderate loads. The sediment impacts on Goodheart Creek and on the drainage through Dry Canyon to Slug Creek are expected to be minimal.

3. AIR RESOURCES

The proposed mining activities will have little effect on the air quality. Some dust and emissions from vehicles will result from the mining operation, especially during the dry season. Some changes in the local microclimate, such as patterns of snow drifting, would occur.

4. VEGETATION

The mining operation will progressively remove vegetation from 611 acres--about 550 acres of conifer-aspen and 60 acres of sagebrush-grass. Forage production ranging from 600 to 1,800 pounds per acre, air dry weight, will be lost. About 3 million board feet of conifer timber will be removed.

5. WILDLIFE

About 611 acres of natural habitat will be destroyed. This includes significant winter and summer range for deer, elk, moose, and other animals, including an important habitat for blue and ruffed grouse.

The proposed mine will block migration routes and limit travel of elk, deer, moose, and other animals moving across and along Dry Ridge. As many as 25 deer, 35 elk, and probably less than 5 moose will be lost. The major travel routes, especially for elk, are in the wooded draws that lead to saddles in Dry Ridge. Several of these routes are near the northern end of the lease. Other potential migratory routes to Diamond Creek are at the southern boundary of an elk calving area along Dry Ridge near the middle of the lease. This calving area will probably be disturbed by the mining; from 25 to 30 elk may be disturbed.

Elk migration routes will be undisturbed by the alternative A conveyor system, but they would be blocked by the alternative B conveyor system. Either alternative will block movement of resident deer, and likely block migration routes for other deer as well.

Raptors will be displaced from both nesting and hunting areas.

6. FISHERIES

The limited fish populations will be depressed and probably eliminated in the Stewart Creek drainage.

The effects on the aquatic environment and fisheries will depend on the final selection of an alternative dump. The alternative A dump will have low to moderate impact on fisheries in the Blackfoot River through the Maybe Creek drainage; alternative B will adversely affect fisheries through the Stewart and Diamond Creek drainage.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Mining will progressively remove forage from 611 acres of rangeland with an average annual production of about 400 to 800 pounds of usable forage per acre, air dry weight. During the life of the mine, as many as 1,315 sheep months, valued at about $2,050 annually, will be lost on at least part of the site; some additional forage may be lost on adjacent lands.

2. SOCIOECONOMIC DEVELOPMENT

The proposed mine will employ about 260 people when fully operational. The social and economic impacts at the site are minimal and by themselves are not significant. The cumulative effects of this and other proposed mines on the region are described in Part 1, Chapter III.

3. TRANSPORTATION AND UTILITIES SYSTEMS

The proposed access road will provide access to an area now inaccessible to automobiles. A one-mile segment of the road in Maybe Canyon will be covered by the proposed dump, a 1.3-mile segment of the road in Stewart Canyon by the alternative dump.

4. RECREATION RESOURCES

The recreation resources of the area will be diminished, as discussed in Part 1. Impacts on hunting and pleasure driving will be very high.

5. ARCHEOLOGIC AND HISTORIC VALUES

A survey revealed no archeologic sites on the minesite, which would be impacted by the proposed action.

6. AESTHETICS

The minesite is in view of the Dry Valley Road and will be visible for long distances. The aesthetic impact will thus be high. The proposed conveyor and road development on the steep topography at the site will introduce harsh lines against the landscape. The impact will be major and may be greater than that of the mine itself.

CHAPTER IV
MITIGATING MEASURES

State and Federal laws, regulations, and administrative policies that require mitigation or reclamation of mining impacts, and requirements of the surface-management agencies and the USGS District Mining Supervisor are discussed in detail in Part 1, Chapter IV. These shall be required at this site. Other possible mitigating measures as discussed in Part 1, Chapter IV, shall also be required as appropriate.

The following company proposals for mitigating impacts are taken from the mining plans and accompanying environmental assessment and report.

The mine plan and environmental report state that when pits space is sufficient, waste will be backfilled into the preceding mined panel.

Waste rock will be placed sequentially at prepared dump sites at slopes 2:1 or flatter. Shallow diversion channels of uniform grades of 5 percent or less will control runoff on the dump faces. Runoff will be diverted into sedimentation ponds. Early in the fifth year of mining, the waste area will be completed, contoured, and revegetated. According to IMC, topsoil is too thin to permit stockpiling separately from waste. After completion of the waste dump, overburden and waste shale will be backfilled into the mined-out pit as mining progresses. The backfilled surface will be contoured and shaped to control drainage.

To prevent siltation of Maybe Creek, a siltation pond will be built at the south end of the dump. A ditch across the downstream dump face will direct runoff to the pond. If the alternate dump site B is used, a siltation pond will be constructed in Stewart Canyon to protect drainage into Diamond Creek. Although the mining plan also specifies the need for a siltation pond downstream in Maybe Canyon, location and engineering details are not given. Three siltation ponds will remain in the south part of the reclaimed pit areas to protect drainage eastward into Diamond Creek.

Discussion with company representatives disclosed that the mine plan is only conceptual; the final plan may require part, at least, of both the proposed Maybe Canyon and Stewart Canyon sites for waste disposal.

Revegetation of disturbed land will involve seed-bed preparation, fertilization, and seeding with adaptable plant species. Where response to initial seeding is poor, spring reseeding will be done. Sprinkler irrigation will be considered as a means of obtaining greater success in seedling establishment. The planned sedimentation ponds may be used as a source of water. Also, in selected areas where the quick establishment of a vegetative cover is highly desirable and feasible, hydromulching will be considered as a special method for applying a slurry mixture of seed, fertilizer, and mulching material.

Accepted construction techniques employing erosion control practices will be used. Mulching and seeding, use of netting, wires, berms, properly located culverts, drains, outfalls, and similar devices, and techniques currently in use by highway departments will also be used.

Additional hydrologic data should be obtained prior to mining to define existing runoff and seepage conditions that will affect the mining operations and may create unstable dump conditions.

CHAPTER V
ADVERSE EFFECTS THAT CANNOT BE AVOIDED

If mining should occur, changes in the land surface are unavoidable (fig. 8-5); however, all disturbed lands will be reclaimed. Disturbance of soils on 611 of the 864 acres on the leasehold cannot be avoided.

Significant high increases in sediment loads, ranging from 6 to 12 times to 30 to 60 times present loads in on-site streams cannot be avoided. The ground-water regimen at this site will be unavoidably altered. Aquifers will be interrupted and drained, which will reduce present seepage into Stewart Canyon and Maybe Canyon Creeks.

Some additional dust and emissions from vehicles during the mining operations is unavoidable.

Vegetation will ultimately be removed from 611 acres, with about 150 acres cleared at any one time during most of the life of the mine. After the minesite has been reclaimed, annual forage production on the entire 611 acres will probably not exceed 400 to 1,000 pounds per acre, air dry weight--about half the present value.

Loss of about 50 elk, 25 deer, and perhaps 2 or 3 moose, from mining cannot be avoided. Restrictions on the movements of these species caused by steep highwalls and vehicular traffic also cannot be avoided. Alteration and destruction of 500 acres of breeding, nesting and brood-rearing habitat for forest grouse cannot be avoided.

Loss of the limited fisheries in Stewart Creek cannot be avoided if alternate dump B is selected. Severe reduction in fisheries in Diamond Creek would also result from selection of this dump site.

Forage will ultimately be removed from 611 acres of rangeland. After the minesite has been reclaimed, average annual production of usable forage on the entire 611 acres will probably not exceed 200 to 400 pounds per acre, air dry weight.

Unavoidable impacts on regional socioeconomic development, recreation resources, archeologic, and aesthetic values are similar to those discussed in Part 1.

If the mining does not occur, there will, of course, be no impacts. Based upon recent company statements, the Task Force does not believe mining will occur in the foreseeable future (to 2000 A.D.).

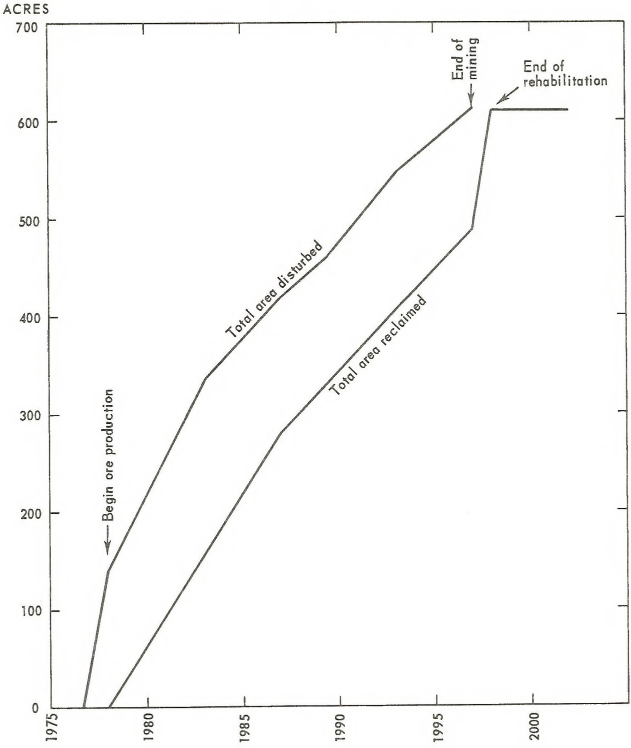

Figure 8-5.--Land disturbance and reclamation, Husky No. 1 site.

CHAPTER VI
SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

Based upon mining plans as originally submitted, 51.5 million tons of phosphate rock will be removed from the site for processing into fertilizer. Mining will disturb soils on 611 acres and move 235 million cubic yards of overburden and bedrock.

During the mining operation, ground-water levels will be lowered and runoff will decrease. Concurrent increases in sediment will reduce and probably eliminate the limited fisheries onsite, and possibly affect those in Diamond Creek if waste dump B is selected. There will be some short-term lowering of air quality from dust and vehicle emission.

Vegetation will be progressively removed from 611 acres; forage production of 600 to 1,800 pounds per acre, air dry weight, will be lost on about 150 acres at any given time. Wildlife will be disrupted. As many as 25 deer, 50 elk, some moose and a few other game animals will be displaced from 611 acres of habitat to adjacent ranges. On the minesite, as many as 1,315 sheep months of forage, valued at $2,050 annually, will be lost during mining, because at least part of the site will not be available for grazing. The aesthetics of the area and its recreation resources will be lowered during the mining operation.

Long-term productivity of the area will decrease. Although most of the pit will be backfilled, it is not likely that vegetation on the disturbed soils will recover to premining levels. After the minesite has been reclaimed, annual forage production on the entire 611 acres will probably not exceed 400 to 1,000 pounds per acre, air dry weight--about half the present value. Some long-term reduction in game herds, especially elk and deer, will result from competition on nearby ranges from the displaced animals. Average annual production of usable forage on the 611 reclaimed acres will probably not exceed 200 to 400 pounds per acre, air dry weight. On the entire site, average production of usable forage of about 660 sheep months, valued at $1,025, will be lost annually. The land disturbance, with a partial backfilling of pits will have some long-term effect upon the aesthetic character of the area by contrasting with its natural visual characteristics.

CHAPTER VII
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Based upon mining plans as originally submitted, about 51.5 million tons of the estimated 1 billion tons of reserves in southeastern Idaho will be mined and processed. This ore contains 1.2 million short tons of fluorine, 41,000 short tons of vanadium, 5,700 short tons of uranium, and 52,000 short tons of rare earths, which will be removed but not recovered. This is irretrievable. The landscape changes resulting from pits and dumps are largely irreversible. The disturbance of soils and attendant reduction of productivity on 611 acres is also largely irreversible. Loss of wildlife, to the extent that it cannot relocate successfully, is also irretrievable. The remote, undeveloped character of the area and attendant semi-primitive recreation uses will be irreversibly and irretrievably altered by mining-related changes. The loss of fisheries also is irretrievable, but limited.

The mining and reclamation will require about 40 million gallons of diesel fuel, 2.1 million gallons of gasoline, and unknown amounts of lubricants, explosives, and construction materials. Rail haulage of the ore from the mine to a plant near China Hat will require about 5.1 million gallons of diesel fuel. Beneficiating at a proposed plant near Soda Springs will consume 400 million kilowatt hours of electricity, 140,000 tons of coal, 210,000 gallons of gasoline, and about 71,000 acre-feet of water. About 7,000 tons of steel, 13,000 cubic yards of concrete, 23,000 tons of aggregate, and 4,000 tons of cement will be required for the beneficiating plant.

Conversion of the beneficated rock to fertilizer at plants outside the area will require 4.5 billion kilowatt-hours of electricity, 210,000 gallons of gasoline, and 46 million tons of sulfuric acid.

CHAPTER VIII
ALTERNATIVES

The general administrative options available to the Secretary of the Interior are discussed in Part 1. IMC has no proposals other than Husky No. 1. The proposed minesite adjoins the proposed South Maybe Canyon minesite, which, in turn, adjoins the ongoing Maybe Canyon mine. Rejection of the IMC proposal would limit immediate impacts to those adjacent areas.

The following are alternatives to the proposed mine plan. IMC proposes partial backfilling. Alternatively, the pits could probably be completely backfilled, but dumps would still remain. Proposed alternative dump A in Maybe Canyon would impact only ephemeral streams; proposed dump B in Stewart Canyon would lower water quality and fish populations in Stewart, Diamond Creeks and the Blackfoot River. Proposed alternative conveyor A would avoid all but the north end of an elk calving area; proposed conveyor B would bisect the calving area and would require about 3 miles more railroad. A, however, would be about 2.3 miles long, B about 1.8 miles long. Both alternatives would block movement of resident deer and would probably block migration routes as well. The access road would follow the conveyor; the difference in impacts between the alternative roads would be far less than the difference in impacts between the alternative conveyor routes.

PART 9

MONSANTO COMPANY

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PART 9
MONSANTO COMPANY

Monsanto has produced elemental phosphorus from a furnace plant at Soda Springs since 1952. In 1975, about 1.0 million tons of phosphate ore were processed with 230,000 tons of silica and 120,000 tons of coke to produce 100,000 tons of phosphorus, 7,500 tons of ferrophosphorus, and 900,000 tons of slag. The phosphorus is manufactured into various chemical compounds outside the area. The ferrophosphorus, averaging about 7.5 percent vanadium, is recovered in the Kerr-McGee vanadium plant about half a mile from the Monsanto plant. Small amounts of the slag are used in the local construction industry.

The phosphate ore comes from Monsanto's Henry mine about 17 miles north of the plant. The company estimates that plant consumption will increase from 1.5 million tons in 1978 to 3 million tons by about 1985, and that reserves at the Henry mine will be depleted by 1983. The company proposes, therefore, to develop sequentially four new mines, the Henry North Continuation, Trail Creek, Caldwell Canyon, and Blackfoot Bridge mines. Each involves Federal and State phosphate leases as well as fee-owned surface and mineral rights. As originally proposed, the Henry North Continuation mine will probably produce about 3.5 million tons of ore from 1983 through 1984; the Trail Creek mine 30 million tons from 1985 through 1994, the Caldwell Canyon mine 12 million tons from 1995 through 1998, and the Blackfoot Bridge mine 3 million tons during 1999. The revised schedule of production, based upon a lesser rate of mining, is shown in table 1-1-a.

PART 9.1
HENRY NORTH CONTINUATION MINING PLAN

CHAPTER I
DESCRIPTION OF THE PROPOSED ACTION

The proposed project lies 18 miles north-northeast of Soda Springs, on the east slope of a small ridge about 1 mile east of the village of Henry. The plan involves 400 acres of Federal phosphate lease I-011451 (fig. 9-1), an additional 40 acres of private land on lease I-013814, and 40 acres of State land covered by Idaho State Easement No. 4066. Surface rights to 200 acres of lease I-011451 are State-owned; 200 acres are privately owned by Monsanto.

The mining plan as submitted does not contain sufficient engineering detail for final consideration of approval or disapproval under Federal Regulation 30 CFR 231. The following details are lacking at this time and will be required for final consideration.

1. The plan needs geologic cross-sections at 500-foot intervals at a scale 1" - 100' or greater.

2. Sections through the dump and erosion control in vicinity of the dump are needed.

3. Mining sequence and location of pit access road slots from the main haulage corridor are not shown.

4. Drilling and trenching activities are not discussed even though their locations are shown on Exhibit E. Drill logs are needed.

5. Mine facilities for workers and equipment are not identified.

6. Power requirements and transmission routes are not identified.

The following information is taken from the mining plan submitted by Monsanto on December 19, 1974, to the Conservation Division, U.S. Geological Survey, Pocatello, Idaho, and from interviews with company officials.

A. PROPOSED MINING OPERATIONS

Monsanto has been mining for several years on the southeast strike projection of the Phosphoria. The proposed minesite is a northwestward extension of present activities (fig. 9-2). The mine will begin producing in about 1983, when the middle and south continuations of the Henry mine are depleted. As originally proposed, it will be depleted in about 2 years, when the Trail Creek mine is expected to begin production. Under the revised rate of production, it will produce for 3 years.

The ore body strikes about N. 40° W. for about 6,500 feet and dips 55° to 70° northeast. At a 3:1 stripping ratio, this body is expected to yield about 3.5 million tons of ore, and dumps will comprise

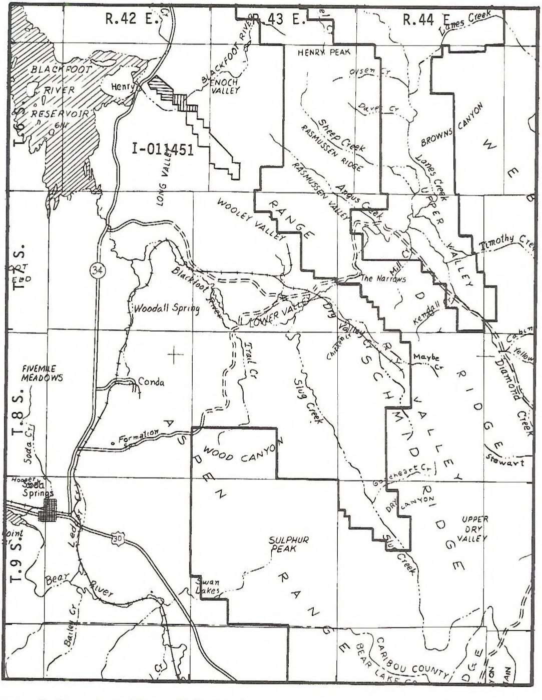

Figure 9-1.-- Location of Federal phosphate lease for the proposed Henry North Continuation mine. Patterning shows area of proposal.

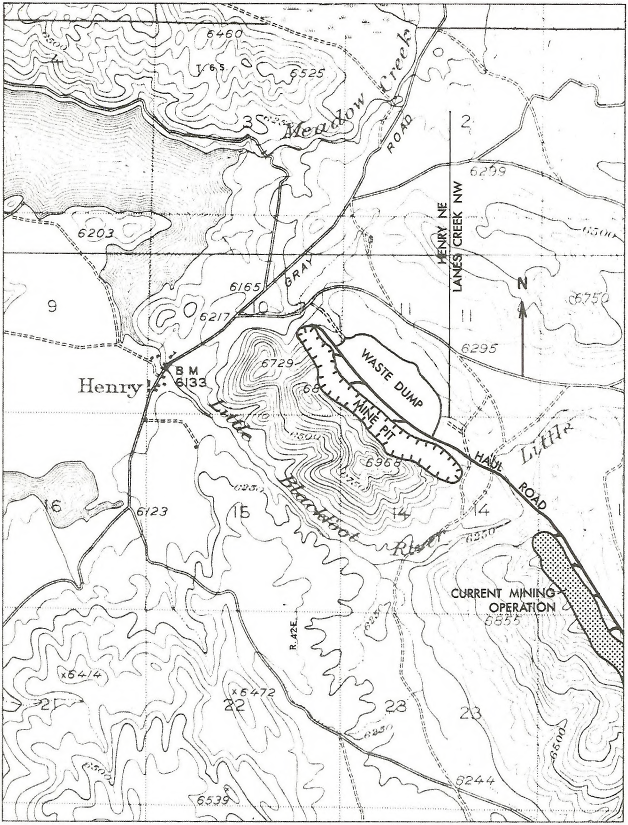

Figure 9-2.--Mining plan proposed for the Henry North Continuation site.

about 15 million cubic yards of waste. The pit at completion of mining, will be about 6,500 feet long, 550 feet wide, and as deep as 400 feet.

The overburden will be removed by rubber-tired scrapers assisted in loading by crawler dozers. Overburden will be drilled and blasted, as necessary. Waste will be placed in a dump east of the pit. Exposed ore will be selectively mined through the use of rubber-tired scrapers assisted by crawler dozers equipped with slope boards to expedite clean separation of ore and waste. Scrapers will carry the ore to a stockpile adjacent to the pit. Ore will be hauled by truck about 16 miles over private haul-road to the plant, generally between May 15 and November 15, to avoid freezing of ore in the trucks.

Pit walls will be left with an average slope of about 45° with horizontal benches at 50-foot vertical intervals. The tops of walls will be guarded by a ditch 20 feet from the escarpment, a barb-wire fence between the ditch and the escarpment, and a 6-foot-wide safety bench 5 feet below the surface on the escarpment.

The overburden disposal areas will be designed and so scheduled that the coarse rock will be placed in the interior and the surface will be covered with topsoil and (or) selected intermediate waste shale. Dump faces will be benched at 50-foot vertical intervals and have an overall slope not in excess of 30° (1.7:1).

B. RECLAMATION

The plan is to leave the pit unfilled to facilitate rock exploitation of remaining ore-grade rock when greater stripping ratios are economically feasible. Pit benches and all other disturbed surfaces will be covered with at least 12 inches of soil and select shale to promote revegetation. Each area as inactivated will be scheduled for rehabilitation and planted during the first spring. Grasses, forbs, and shrubs would be planted.

Of the 480 total acres at the minesite, 225 acres will be disturbed: 85 acres by the mine pit, 85 acres by the waste dump, 30 acres by roads, and 25 acres by safety and water-control measures.

C. SURFACE FACILITIES

The only surface facility is a loading tipple next to the pit. Raw ore will be hauled over private road to the Monsanto plant at Soda Springs.

CHAPTER II
DESCRIPTION OF THE EXISTING ENVIRONMENT

A. NATURAL ENVIRONMENT

1. CLIMATE

The general climate of the area is described in Part 1.

Temperatures at the minesite average a few degrees lower than those at Conda, and the growing season is shorter. Annual precipitation at the site is about 20 inches.

Patterns of drifting are not known, but prevailing winds tend to produce drifts on the east-facing slopes at the site.

2. LAND RESOURCES

a. Land Surface

The proposed mine is at the north end of the Wooley Range, which ends near the Blackfoot River Reservoir (fig. 9-2). The Little Blackfoot River cuts through the Wooley Range, marks the south end of this mine and the north end of the Center Continuation of the Henry mine. The ridge on which the mine is located is about 500 feet above the Little Blackfoot River.

b. Geology and Mineral Resources

On the site, beds of the Meade Peak strike about N. 40° W. and dip 55°-70° NE. The minesite extends about 6,500 feet along the Meade Peak outcrop, which appears to be free of structural complications. The Meade Peak is overlain by cherty shale or a thin tongue of the Rex Chert.

The Meade Peak is about 164 feet thick, and the lower and upper phosphate zones total 56 feet thick. The company plans to produce about 3.5 million short tons of phosphate rock. Estimates of the total resources of some significant elements in the ore are 84,000 short tons of fluorine, 385 short tons of uranium, 2,800 short tons of vanadium, and 3,500 short tons of rare earths. At the present time, the company plans to recover only the phosphate and some of the vanadium from this and the other mines that will be developed later in the sequence.

c. Soils

The distribution of landtype associations at the minesite is shown in figure 9-3; soil characteristics are given in table 9-1.

Landtype associations 1 and 4 occur on the minesite. They are described in part 1, chapter II.

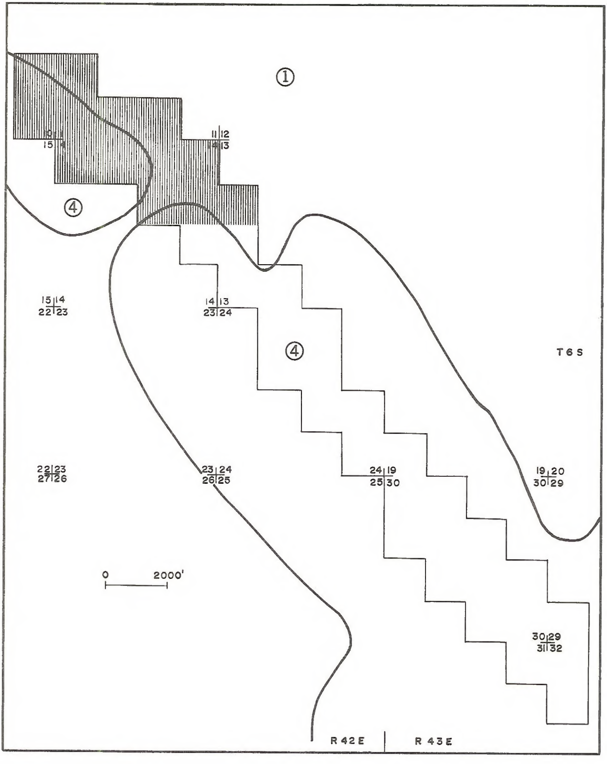

Figure 9-3.--Landtype associations near the Henry North Continuation site. Patterning shows area of proposal.

Table 9-1.--Physical characteristics of soils at Henry North minesite. VL = very low, L = low, M = moderate, H = high, VH = very high

Landtype Assn.	Soil families	Erosion in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road construction hazards	Slope range, in percent	Revegetation potential
			Depth, in inches	Suitability					
1	Cryic Pachic Paleoborolls, fine-loamy, mixed	0.005	10	M	9.2	VL	VL	10-25	VH
	Pachic Cryoborolls, loamy-skeletal, mixed	.001	12	H	4.3	VL	L	1-10	VH
	Cumulic Cryaquolls, fine-loamy, mixed	.000	15	L	3.7	VL	L	0-2	VH
4	Pachic Cryoborolls, loamy-skeletal, mixed	.001	12	H	4.3	VL	L	1-10	VH
	Argic Pachic Cryoborolls, fine, montmorillonitic	.015	12	M	9.0	M	M	25-45	M
	Cryic Pachic Paleoborolls, fine, montmorillonitic	.015	12	M	9.0	M	M	20-40	M
	Argic cryoborolls, fine, montmorillonitic	.015	8	L	8.0	M	M	25-45	M

3. WATER RESOURCES

a. Water Supply

1. Surface Water

The proposed mine lies near the base of a northeast slope just above the west end of Enoch Valley and a quarter to three-quarters of a mile north of Little Blackfoot River. Only about 100 acres lies upridge from the pit. Annual water yield from precipitation and drifting snow is estimated to be 12 inches, but may be less if snow drifting is minor. Yield distribution between surface water and ground water is not known, but a large part probably infiltrates the ground. Underflow from adjacent drainages is minimal.

2. Ground Water

Drill-hole data at the site indicate that ground water is virtually absent in the proposed pit area but that some, probably a small amount, is perched in alluvium on the east side of the pit. Several 200-foot test holes for water were dry. One drilled to 600 feet, was reported to be virtually dry. However, the bottom of the proposed pit will be about level with the Little Blackfoot River and the Blackfoot River Reservoir and could reach a fracture system that contains water.

b. Water Quality

Although no water-quality data are available in the immediate vicinity of the site, several analyses are available for the Blackfoot River about 6 miles south of the site. A sample on December 11, 1974, was mainly a calcium bicarbonate type. Values for two sets of measurements for trace elements at the same site are given below in micrograms per litre. The values are for field-filtered and field-acidified samples, and hence may be considered as those concentrations in solution. Flows at the time were 79 cfs for the December 12 sample and 70 cfs for the March 25 sample. The pH was 7.2 for both.

Element	December 12, 1974	March 25, 1975
Arsenic	0 [1/]	0
Cadmium	1	0
Lead	1	0
Mercury	.9	.6
Molybdenum	0	0
Selenium	1	0
Vanadium	1.5	.4
Zinc	3	10

[1/] Concentrations reported as 0 are less than detectable amounts.

These values are very low. Measurements for nutrients on the same dates showed nitrate plus nitrite as NO_3 as 1.4 ppm on December 12, and 0.4 ppm on March 25, and dissolved orthophosphate as PO_4 as 1.4 ppm on December 12, and 0.09 ppm on March 25.

4. AIR RESOURCES

The air quality near the proposed mine is good. Present mining near the site produces particulates estimated at 0.5 pound per ton of ore. Dust and emissions result from road traffic.

5. VEGETATION

On the Henry North site, about 100 acres of the entire 480-acre minesite are in dryland agriculture, 140 acres in conifer-aspen, and 240 acres in sagebrush-grass cover. Forage production ranges from 400 to 1,600 pounds per acre, air dry weight. The timber has no present commercial value. A small amount of riparian cover is at the south end of the site along the Little Blackfoot River.

No rare or endangered plant species are known on the site.

6. WILDLIFE

Deer, elk, and moose inhabit the site in significant numbers. A small year-long resident population of deer is joined by a larger migrant population in the winter, bringing the total to about 150. The south- and southwest-facing slopes are critical winter ranges. A significant migration route borders the present mining operation. Deer that summer in the Wooley Range migrate downslope as snow builds up, and they winter along southern exposures of ridges around the present mining site, along Blackfoot Reservoir, and immediately west of Henry.

Elk also winter and migrate through the area. The Idaho Department of Fish and Game estimates that 5 to 15 elk winter in or around the site. Some of the elk that summer in the Wooley Range and Diamond Creek area probably migrate to the Willow Creek area to winter. Moose visit the area only during severe winters. Cougar and black bear may inhabit the area, but only infrequently.

Sage-grouse habitat is excellent, primarily for brood-rearing and summering. Blue and ruffed grouse are year-long residents. Blue grouse nest and raise their young in the sagebrush/grass habitats and migrate upslope to conifer habitats to winter. Other game birds, such as Hungarian partridge and mourning doves, probably inhabit the area, but little information is available.

The area provides a large prey base for raptors; 13 species stay year round, 4 are migratory, 7 occur occasionally, and 1 winters on the site.

Furbearers do not inhabit the area in significant numbers, but weasels, fox, coyote, and bobcat are frequent visitors. Nongame species include mice, moles, ground squirrels, and other small mammals. The area has both resident and migratory song birds. Amphibians and reptiles include western and Woodhouse toads; ringnecked, green, common and western garter snakes; and western rattlesnakes.

The area is also used by wintering bald eagles, as well as American rough-legged hawks, and a known migration corridor for raptors lies to the east near Gray's Lake.

No threatened or endangered species are known to inhabit the area, but the peregrine falcon may use the area occasionally; one nest within 10 miles of the proposed mine is known to be active. Prairie falcons are possible inhabitants.

7. FISHERIES

The Little Blackfoot River which drains the Henry North area has been stocked in the past with rainbow trout but there was no annual carryover. The stream is not stocked at present. Fishing is good where the stream enters the Blackfoot River Reservoir. A travertine dam (falls) blocks migrant runs of spawning cutthroat trout from using the system. Brook trout may be resident in the stream.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

The site adjoins a half-mile wide dry-farming area which lies in the valley between the leasehold on the foothills to the southeast (most of which is owned by Monsanto) and the foothills to the northeast. Crops grown are small grains and other dryland crops.

2. SOCIOECONOMIC DEVELOPMENT

The proposed Henry North mine will be the northward extension of an ongoing mine that employs about 80 people.

3. TRANSPORTATION AND UTILITIES SYSTEMS

With the exception of primitive drilling access roads, no transportation or utilities systems cross the site. Access to the area is good via Highway 34, a two-lane oiled road, but access to the site is only by private haul road not open to the public.

4. RECREATION RESOURCES

The area around the proposed Henry North Continuation has quality outdoor recreation resources. The Little Blackfoot River runs through the leasehold, and Blackfoot River Reservoir is less than 1 mile away. Both the river and the reservoir offers quality fishing and other water-oriented recreation. Boat ramps and rental facilities are available near the reservoir. Other recreation includes hunting, driving for pleasure, camping, and off-road vehicle use, especially snowmobiling. The leasehold has a potential for a variety of recreation, including ORV use, bird hunting, camping, and picnicking, even though there are some legal access problems and lack of water.

The site is not remote, owing to its proximity to the Blackfoot River Reservoir and the present Henry mine 1½ miles to the south.

5. ARCHEOLOGIC AND HISTORIC VALUES

In July, 1975, Professor B. Robert Butler, Associate Professor of Anthropology, Idaho State University, conducted an archeologic survey of the leasehold. No archeologic or historic materials were found, and an archeological clearance was recommended.

6. AESTHETICS

The variety class for the Henry North area is rated moderate. Mining would be in the foreground or immediate middleground viewing zones of Highway 34 and the Blackfoot Reservoir. The open, flat valley bottom and reservoir area contrast strongly with the hill proposed for mining. Mining exploration and related activities have reduced the aesthetic quality; however, the area still provides an important aesthetic resource to the many visitors year-round.

CHAPTER III
ENVIRONMENTAL IMPACTS

There will be no difference in impacts at either level of mining: that originally proposed, or that shown in table 1-1a.

A. NATURAL ENVIRONMENT

1. LAND RESOURCES

a. Land Surface

Mining will create 85 acres of pit and 85 acres of dump. Roads and other facilities will modify 55 acres. The pit will be 6,500 feet long, 550 feet wide, and about 400 feet deep. Waste rock will total about 15 million cubic yards.

b. Geology and Mineral Resources

Mining will remove 3.5 million short tons of phosphate rock containing 84,000 short tons of fluorine, 385 short tons of uranium, 2,800 short tons of vanadium, and 3,500 short tons of rare earths. Both phosphate and vanadium will be extracted.

c. Soils

Mining on the Henry North Continuation will disturb soils on 225 acres, at a rate of about 50 to 80 acres per year.

2. WATER RESOURCES

a. Water Supply

1. Surface Water

If flows from the Henry North Continuation pit and dump areas accumulated in one channel, flow could be as great as 70 cfs; some runoff could reach the Little Blackfoot River, and some could pond on small segments of farmland in Enoch Valley. However, flows will not likely accumulate in one channel and water should not reach Enoch Valley. If present drainage patterns are preserved as nearly as possible, runoff and impact from disturbed areas will be minimal.

2. Ground Water

Mining will probably have a negligible impact on ground water; the site is on a ridge, which is almost drained of ground water. The dump will be on a thin alluvial deposit that contains a small quantity of water. This water could be tapped, but the dump would inhibit recharge, and even small yields may not be sustained.

b. Water Quality

Impacts on water quality will be similar to those discussed in Part 1. Proximity of the site to the Little Blackfoot River increases the likelihood of sediment reaching the Little Blackfoot River.

3. AIR RESOURCES

The proposed mine will not change regional air quality, inasmuch as it is a continuation of present mining. Small amounts of dust and emissions will continue to result.

4. VEGETATION

Mining will progressively remove vegetation on 225 acres, of which approximately 180 acres are conifer-aspen and 45 acres are agricultural land.

5. WILDLIFE

The development of the Henry North mine will remove critical winter range for about 150 deer which will be lost. A significant migration route will be blocked, forcing alteration of migration patterns. Winter range for 5 to 20 elk will be removed, and an important migration route will be blocked.

Sage grouse summer range and blue grouse nesting habitat will be altered, affecting about 60 grouse. Removal of pockets of mature conifer will eliminate ruffed and blue grouse winter habitat.

Populations of small birds, hares, and rabbits, and of other prey species such as squirrels, mice, and other rodents will be reduced thereby reducing the hunting area for prairie and peregrine falcons and other raptors. Predators such as bobcats, foxes, and coyotes will decline.

6. FISHERIES

There will be no direct impacts on fisheries at the minesite; however, the Henry North Continuation could affect downstream fisheries by contributing sediment to the Little Blackfoot River.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Mining will progressively remove forage from 225 acres, of which about 180 acres are rangeland with an estimated average annual production of about 300 pounds of usable forage per acre, air dry weight. During the life of the mine, about 90 AUM's, valued at $530 annually, will be lost on all or part of the site; some additional forage may be lost on adjacent lands.

2. SOCIOECONOMIC DEVELOPMENT

The proposed Henry North Continuation mine will employ about 140 people at full operation. The social and economic impacts to the site will be minimal and by themselves are not significant, but the cumulative effects of this and other mining proposals will signifiantly impact the regional socioeconomics as described in Part 1.

3. TRANSPORTATION AND UTILITIES SYSTEMS

Assuming rail or conveyor systems are not implemented, the proposed Henry North haul road will probably be restricted to ore-transport vehicles during mining. Upon completion of the mining, however, the road may revert to the county road system, improving access to the area.

4. RECREATION RESOURCES

The proposed mining on the Henry North Continuation will decrease hunting opportunities, particularly for bird hunting. Mining and mining-associated facilities will restrict the present use of the area for snowmobiling, horseback riding, and motorcycle riding. Increased human activity in the area will also lower the quality of the outdoor recreation resources.

5. ARCHEOLOGIC AND HISTORIC VALUES

No known sites will be impacted.

6. AESTHETICS

Impacts of the proposed Henry North Continuation will be severe, because of the proximity of Idaho Highway 34, the community of Henry, and the Blackfoot River Reservoir.

CHAPTER IV
MITIGATING MEASURES

This chapter discusses mitigating measures that apply to the Henry North Continuation, Trail Creek, Caldwell Canyon, and Blackfoot Bridge proposals; in addition, it discusses measures that apply specifically to the Henry North Continuation.

State and Federal laws, regulations, and administrative policies that require mitigation or reclamation of mining impacts, and requirements of the surface-management agencies and the USGS District Mining Supervisor are discussed in detail in Part 1, Chapter IV. These shall be required at all four minesites. Other possible mitigating measures as discussed in Part 1, Chapter IV, will also be required as appropriate.

The following proposals for mitigating impacts are taken directly from Monsanto's mining plans for the four minesites.

At all four sites, Monsanto proposes to shape the dumps to blend with the natural topography. Final dump slopes will all be less than 30°. To facilitate future mining, the mine pits will not be backfilled. The company plans to stockpile topsoil for later spreading over disturbed areas. Middle waste shales will also be used as a planting medium. Disturbed areas will be scarified or otherwise prepared for seeding, which will be done the first spring after activities are terminated on an area.

The company proposes to construct access roads as close to the natural contour as possible and to replace topsoil on dump sites where possible prior to reseeding. Access roads will be revegetated upon completion of mining operations. Where the flow of water might concentrate, channels will be rock lined. Drainage channels where runoff might be significant will be diked, to provide sediment catch basins. Dumps will be designed with chert and limestone in the interior and middle shales on the exterior, which stabilizes the dumps, according to the company, and provides a desirable planting medium. The dumps will be revegetated the first spring after activity has ceased.

The company plans no mitigating measures for water quality because it anticipates no problems. The company plans to control dust at the minesites by watering.

Requirements and stipulations to mitigate impacts on archeologic and historic sites are described in part 1.

The following stipulation should be imposed as an additional mitigating measure for the Henry North Continuation.

A settling pond should be constructed to ensure that materials eroded from waste dumps do not enter the Little Blackfoot River during spring snowmelt or storms. Mining close to the river or the reservoir should be prohibited.

Water quality in the Little Blackfoot River should be monitored to determine any effect of the mining on the streams.

CHAPTER V
ADVERSE EFFECTS THAT CANNOT BE AVOIDED

Changes in the land surface are unavoidable (fig. 9-4); the proposed pit will not be backfilled. The mining will thus create 85 acres of pits and 85 acres of dumps. Soils will be disturbed on 225 acres. An unknown amount of sediment will be contributed to Enoch Valley or the Little Blackfoot River.

Mining will ultimately remove vegetation from 225 acres, with about 135 to 165 acres cleared at any one time during most of the life of the mine. Annual forage production on 140 acres of reclaimed land will probably not exceed 200 to 800 pounds per acre, air dry weight--about half the present value. Production on 85 acres of unreclaimed pit will be lost.

An estimated 150 deer and 5 to 15 elk will be lost by alteration of habitat and blockage of migration routes. Habitat for about 60 sage grouse will be altered and mourning dove and rabbit populations will be significantly reduced. About 225 acres of nongame habitat will be disturbed. Hunting areas for raptors will be reduced, which may lead to abandonment of nesting sites in the general area. Habitat for an undetermined number of fur bearers will also be impacted.

Impacts on fisheries will be minor unless sediment reaches the Blackfoot River and the Blackfoot Reservoir.

Forage will ultimately be removed from about 180 acres of rangeland. Average annual production of usable forage on 140 acres of reclaimed land will probably not exceed 150 pounds per acre, air dry weight; forage on 85 unreclaimed acres will be almost totally lost.

The Henry North Continuation will contribute to the aesthetic impact of adjacent ongoing mining. Because the mining will be in view from major roads and public areas, aesthetic impacts will be high.

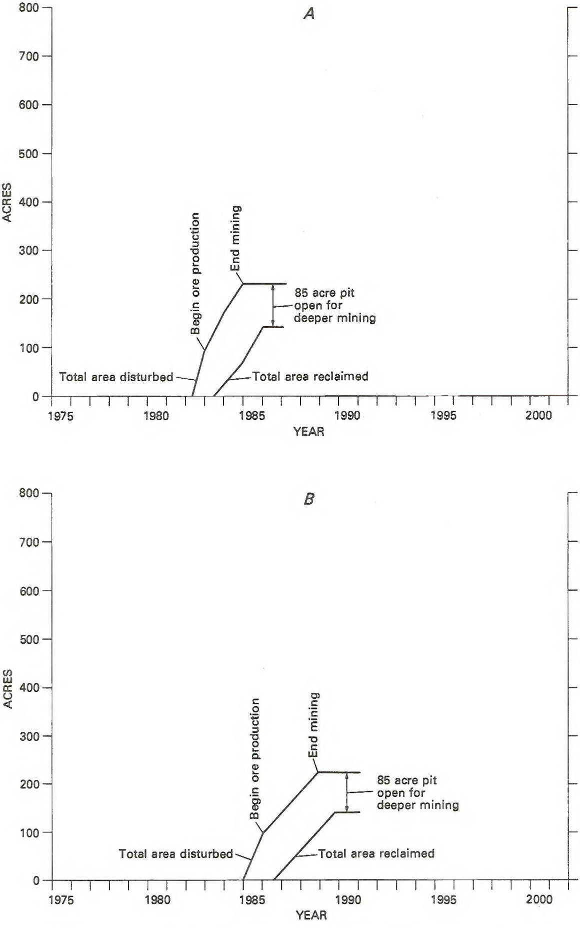

Figure 9-4.—Land disturbance and reclamation, Henry North Continuation site. *A*, Based on mining plan as submitted for approval. *B*, Based on revised level of mining.

CHAPTER VI
SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

Based upon either level of mining, 3.5 million short tons of phosphate rock will be removed from the minesite for processing into elemental phosphorus. Soils will be disturbed on 225 acres, and about 15 million cubic yards of overburden and bedrock will be moved.

During mining, vegetation will be progressively removed from 225 acres; forage production of 400 to 1,600 pounds per acre, air dry weight, will be lost on about 150 acres at any given time. Wildlife will be disrupted. As many as 150 mule deer and 20 elk will be displaced to adjacent winter range at or near carrying capacity. On the minesite, about 90 AUM's of forage, valued at $530 annually, will be lost during mining, because most of the site will not be available for grazing. The aesthetics of the area and the recreation resources will be diminished by mining.

Annual forage production on 140 acres of reclaimed land will probably not exceed 200 to 800 pounds per acre, air dry weight--about half the present value. Production on 85 acres of unreclaimed pit will be lost. Some long-term reduction of elk and deer populations in the area will result from competition on nearby ranges from the displaced animals. Average annual production of usable forage on 140 reclaimed acres will probably not exceed 150 pounds per acre, air dry weight; production on 85 unreclaimed acres will be virtually zero. On the entire site, average production of usable forage of about 55 AUM's, valued at $325, will thus be lost annually. The landscape changes will have a long-term effect on the aesthetic character of the area by conflicting with the natural landscape and contrasting with the present visual characteristics of the area.

CHAPTER VII

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Based upon either level of mining 3.5 million tons of the estimated 1 billion tons of reserves in southeastern Idaho will be mined and processed. This is irretrievable. Along with this, 84,000 short tons of fluorine, 2,800 short tons of vanadium, 385 short tons of uranium, and 3,500 short tons of rare earths will be removed. Vanadium will be recovered. The landscape changes through creation of pits and dumps is largely irreversible. The mixing of soils and attendant full loss of productivity on 85 acres and partial loss on additional 140 acres is irreversible. Loss of wildlife, to the extent that it cannot relocate successfully on adjacent range, is also irretrievable. Additional area along the Wooley Range in the vicinity of the Blackfoot Reservoir will be irreversibly and irretrievably committed to the intrusion of mining related changes.

The mining and reclamation will require about 1.8 million gallons of diesel fuel, 140,000 gallons of gasoline, and unknown amounts of lubricants, explosives, and electricity.

Processing into elemental phosphorus will require 3.6 billion kilowatt-hours of electricity, 14,000 gallons of gasoline, 4.2 million gallons of diesel fuel, 420,000 tons of coke, 810,000 tons of silica, 10,000 tons of carbon electrodes, and about 7,000 acre-feet of water.

Secondary recovery of vanadium by Kerr-McGee will require 30,000 tons of limestone and 4,300 tons each of salt and soda ash.

CHAPTER VIII
ALTERNATIVES

This chapter discusses alternatives that apply to the Henry North Continuation, Trail Creek, Caldwell Canyon, and Blackfoot Bridge proposals; in addition, it discusses alternatives specifically to the Henry North Continuation proposal.

The general administrative options available to the Secretary of the Interior are discussed in part 1. Rejection of one or all of the Monsanto plans would have no effect on impacts before about 1983, when production is to start on the Henry North Continuation. Rejection of that plan would limit impacts to the adjoining present Henry mine, which is several times larger than the proposed continuation. After 1983, production would probably be transferred to another of Monsanto's leases, and impacts would be transferred to that site.

The following are alternatives to the proposed mine plans. Monsanto proposes no backfilling. The alternative of replacing all the waste would nearly eliminate the dumps and fill the pits, but may preclude later recovery of ore at greater depth.

The following alternative applies specifically to the Henry North Continuation.

Monsanto proposes to continue using the private haul road to its processing plant. The road would be extended less than 2 miles and would be used for about 3 years. The alternatives of transporting ore about 6 miles to the existing railroad or about 4 miles to the proposed railroad would probably have greater impacts.

PART 9.2
TRAIL CREEK MINING PLAN

CHAPTER I
DESCRIPTION OF THE PROPOSED ACTION

The proposed project is on the crest of a ridge between Slug and Trail Creeks about 11 miles northeast of Soda Springs. The plan involves Federal phosphate leases, I-013719, I-013720, and I-014081 (fig. 9-5). Of the 2,400 acres in the three leaseholds, surface rights to 1,280 acres are State owned; 1,120 are privately owned. An additional 200 acres adjoining the leaseholds, proposed as a dump site, are privately owned.

Subsequent to filing the mine plan the Company has explored the leasehold by trenching and drilling. Evaluation and results of this program have not been provided as yet to the USGS. The plan does not contain sufficient engineering details for final consideration of approval or disapproval under Federal Regulation 30 CFR 231. The following details are lacking at this time and will be required for final consideration:

1. Dimensions and configuration of each of the four pits are needed.

2. Ore quality and geological structure in the pit areas are not discussed. The placing of the dumps over the down dip ore extension is questionable.

3. Location and design of access and haul road are not identified.

4. Type of transportation and frequency of ore haulage to the furnace plant are not identified.

5. Sediment catchment basins are located on a map but specific design and capacities are lacking.

6. Power requirements and mine support structures are not identified.

The following information is taken from the mining plan submitted by Monsanto on December 20, 1974, to the Conservation Division, U.S. Geological Survey, Pocatello, Idaho, and from interviews with company officials.

A. PROPOSED MINING OPERATIONS

The mine will be developed in four pits and the waste placed in dumps east of the pits (fig. 9-6); the plan does not specify pit dimensions or planned pit-development sequence. At a stripping ratio of 3:1, the mine will yield about 30 million tons of ore during the period 1985 through 1994; dumps will comprise about 126 million cubic yards of waste. The pits will not be backfilled. This will permit future mining at such time as economics permit. The mining plan calls for benched pit walls at unspecified overall maximum wall slope.

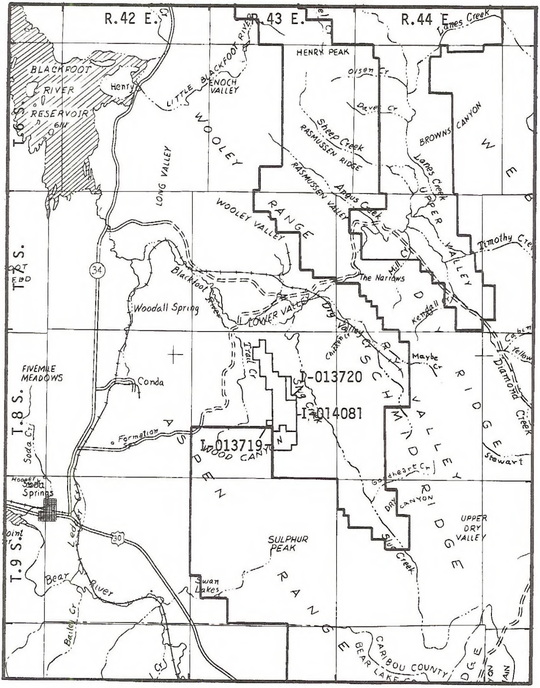

Figure 9-5.--Location of Federal phosphate leases for the proposed Trail Creek mine.

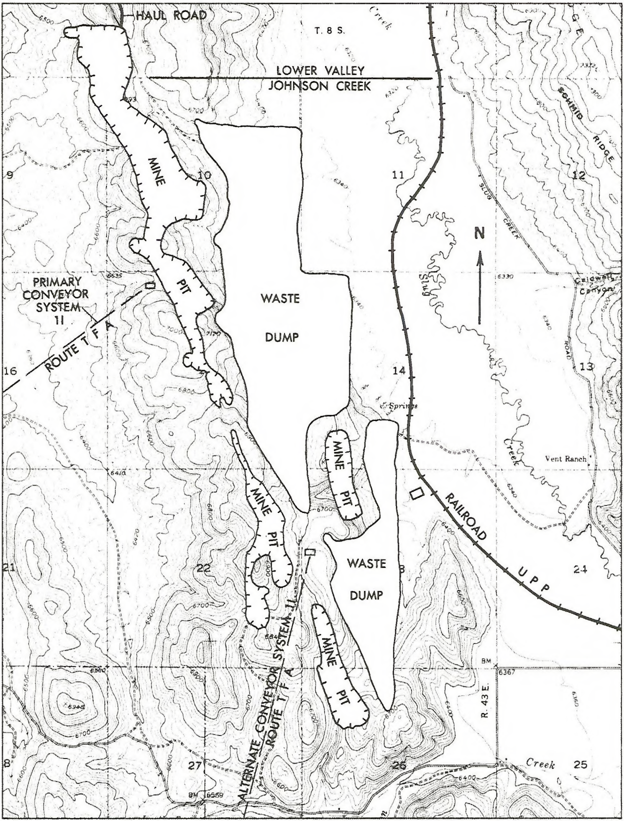

Figure 9-6.--Mining plan proposed for the Trail Creek site.

Stripping and mining will be done by large rubber-tired scrapers assisted by pusher bulldozers, as needed. Drilling and blasting may be used occasionally. Waste will be removed in the winter. Ore and some waste will be removed in the warm months.

B. RECLAMATION

Topsoil may be stockpiled for top-dressing waste dumps and other disturbed areas. Waste dumps will be placed with a maximum slope of 30° (1.7:1 slope), with benches at 50-foot vertical intervals. The surface will be given a smoothly undulating contour. All dump surfaces and mine benches will be covered with at least 12 inches of select waste shale and (or) topsoil. Revegetation will be with grasses, forbs, and shrubs. Trees may be planted in select locations.

Of the 2,400 total acres on the leaseholds, 1,335 acres will be disturbed: 405 acres by mine pits, 730 acres by waste dumps, 100 acres by roads, and 100 acres by safety and water-control measures.

C. SURFACE FACILITIES

No surface facilities are discussed in the plan.

Mine-run ore will be transported to the Monsanto plant at Soda Springs by railroad, off-highway trucks, or belt conveyors in order of decreasing preference. Ore will be hauled from May through November.

CHAPTER II
DESCRIPTION OF THE EXISTING ENVIRONMENT

A. NATURAL ENVIRONMENT

1. CLIMATE

The general climate of the area is described in Part 1.

Temperatures at the minesite average a few degrees lower than those at Conda, and the growing season is shorter. Annual precipitation is about 19 inches. Snow may accumulate to greater depths than at Conda because of lower temperatures. Patterns of drifting are not known, but prevailing winds tend to clear the ridge crests and produce drifts on the east-facing slopes at the sites.

2. LAND RESOURCES

a. Land Surface

Most of the site is on the east side of the ridge that separates Slug Creek valley to the east from the smaller valleys of the Trail Creek drainage to the west (fig. 9-6). The mine will extend about 4 miles from the Johnson Creek drainage northwestward along the ridge. The highest parts of the ridge are slightly over 7,000 feet high, about 700 feet above the floor of Slug Creek valley. The flat-bottomed Slug Creek valley is about a mile wide and is bordered to the east by Schmid Ridge.

b. Geology and Mineral Resources

Outcrops of the Meade Peak follow the crest of the ridge and dip gently northeast. Owing to the low dip of the beds, most of the east side of the ridge is underlain by chert and cherty shale. Complex structures and many small fault blocks characterize the southern part of the area, and small offsets of the Meade Peak outcrops are relatively common throughout the mine area.

The Meade Peak is 147 feet thick at the mine, and the upper and lower ore zones total 37 feet. The company plans to produce up to 30 million short tons of phosphate rock depending upon stripping ratio, which will include 720,000 short tons of fluorine, 3,300 short tons of uranium, 24,000 short tons of vanadium, and 30,000 short tons of rare earths.

c. Soils

The distribution of landtype associations is shown in figure 9-6; soil characteristics are given in table 9-2. Descriptions of the landtype associations are given in Part 1. About 80 percent of the area is in landtype association 11, 10 percent in landtype association 1, and 10 percent in landtype association 4. Landtype association 11 has excellent topsoil potential.

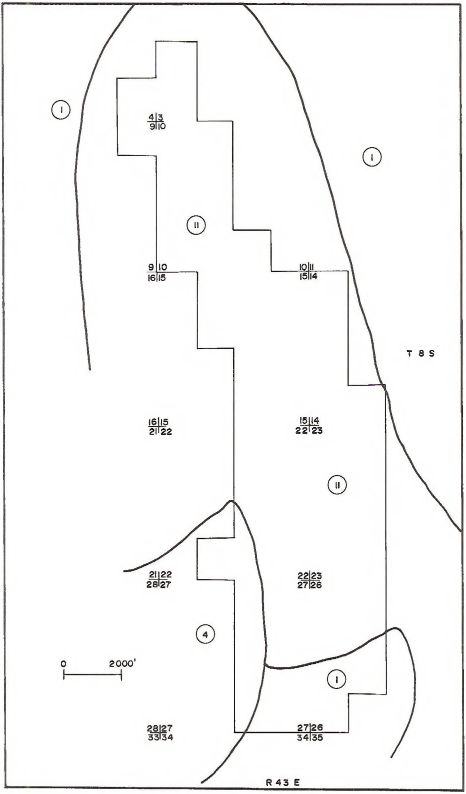

Figure 9-7.--Landtype associations near the Trail Creek site.

Table 9-2.--Physical characteristics of soils at Trail Creek minesite. VL = very low, L = low, M = moderate, H = high, VH = very high

Landtype Assn.	Soil families	Erosion in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road construction hazards	Slope range, in percent	Revegetation potential
			Depth, in inches	Suitability					
1	Cryic Pachic Paleoborolls, fine-loamy, mixed	0.005	10	M	9.2	VL	VL	10-25	VH
	Pachic Cryoborolls, loamy-skeletal, mixed	.001	12	H	4.3	VL	L	1-10	VH
	Cumulic Cryaquolls, fine-loamy, mixed	.000	15	L	3.7	VL	L	0-2	VH
4	Pachic Cryoborolls, loamy-skeletal, mixed	.001	12	H	4.3	VL	L	1-10	VH
	Argic Pachic Cryoborolls, fine, montmorillonitic	.015	12	M	9.0	M	M	25-45	M
	Cryic Pachic Paleoborolls, fine, montmorillonitic	.015	12	M	9.0	M	M	20-40	M
	Argic Cryoborolls, fine, montmorillonitic	.015	8	L	8.0	M	M	25-45	M
11	Cryic Pachic Paleoborolls, fine-silty, mixed	.004	12	H	9.6	VL	VL	10-20	VH
	Argic Pachic Cryoborolls, fine-silty, mixed	.017	10	H	9.6	VL	M	30-40	M

3. WATER RESOURCES

a. Water Supply

1. Surface Water

Two larger pits of the proposed mine are astride the ridge between Trail and Slug Creeks. Drainage here is practically confined to the pits. If drifting doubles available snow on the ridge, water yield of the two pits could approximate 18 inches or 450 acre-feet annually. Distribution of the water yield is unknown.

The two smaller pits and the large dumps straddle intermittent channels that drain fairly steep slopes. Snow accumulation and runoff in these channels are not known. Six springs on the valley floor between the pits and Slug Creek, indicate that underground flow from disturbed areas may be significant. Since snow accumulates to considerable depths upslope, runoff across the dumps during snowmelt is significant. Flows were observed in the intermittent channels on June 5, 1975, but maximums and other flow characteristics are not known.

2. Ground Water

At the Trail Creek minesite, ground water probably moves eastward into the alluvium in Slug Creek Valley. The ridges on the leasehold are mostly drained of ground water. However, exploratory drill-hole data indicate a few scattered bodies of perched water in the Phosphoria, most of it probably in the Rex Chert. The Wells Formation, which forms the footwall of the proposed mine, is apparently dry.

b. Water Quality

The Blackfoot River flows within about 1 mile of the Trail Creek minesite, and its water quality is probably representative of that in the proposed mine area. Water-quality data for several years of record for the Blackfoot River above Blackfoot River Reservoir are given in Part 1. The Blackfoot River below The Narrows, about 4 miles northwest of the proposed mine, was sampled in late 1974 and during the spring and early summer of 1975. Data are as follows:

Parameter	August 20, 1974 to December 18, 1974	January 21, 1975 to July 9, 1975
	(Range in values)	
Number of measurements	12-13	20-27
Discharge (cfs)	80-123	78-1,170
Suspended sediments (ppm)	0-36	0-141
Turbidity (F.T.U.)	0.5-7.7	0.7-73
Hardness as $CaCO_3$ (ppm)	174-200	98-306
Total Kjeldahl nitrogen as N (ppm)	0.9-2.2	1.2-3.2
Total phosphorus as P (ppm)	0.00-0.05	0.10-0.29

The suspended sediment concentrations were not unusually high, exceeding 100 parts per million for only two measurements.

Trace constituents were determined on two samples. Because the concentrations (micrograms per litre) shown below are for unfiltered and acidified samples, they are probably higher than the dissolved concentrations in the water.

Element	August 26, 1974	May 13, 1975
Arsenic	0 [1]	0
Cadmium	0	0
Chromium	1	6
Copper	9	4
Selenium	0	0
Vanadium	0	30
Zinc	2	5

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[1] All concentrations reported as 0 are less than detectable amounts.

4. AIR RESOURCES

The air quality near the proposed mine is good. Dust and emissions result from road traffic.

5. VEGETATION

Of the 2,400 acres of Federal leaseholds on the Trail Creek site, about 520 acres are conifer-aspen, and 1,880 acres are sagebrush-grass. Forage production ranges from 600 to 1,800 pounds per acre, air dry weight. Conifer trees are highly scattered and thus not considered merchantable. Some scattered mountain brush is intermingled with the conifer-aspen and sagebrush-grass. One 40-acre plot on the south end of the area has been planted in grass, and one small area has riparian cover. No rare or endangered plant species are known to be present on the leasehold.

6. WILDLIFE

The sagebrush-grass type habitat is important as elk winter range for about 10 to 15 elk, and is used as a foraging area throughout the entire year. Probably fewer than 5 moose inhabit the area throughout the year. In the last 10 years, deer have decreased in the area, but a population of perhaps 100 deer uses the area yearlong. The mining operation, as planned, will bisect part of a deer migration route. The wind-blown ranges have been used by deer as winter ranges, but most winter ranges are now farther south and west on the Aspen range.

Although no information is available on black bear or mountain lion, it is reasonable to assume that this area is within the seasonal range of a few.

The area is a critical sage grouse wintering area; grouse have been observed there in the winter months. The area is also an important nesting location, inasmuch as nesting and strutting grounds are normally found in conjunction with winter range. Blue and ruffed grouse are common. The small Columbian sharptail grouse population in this area is making a comeback.

Cottontail and snowshoe hares are common; bobcat, coyote, and red fox populations are similar to those for the region. Six species of amphibians are present, including the spadefoot toad.

No threatened or endangered species are known to inhabit the area, but pine marten and fisher may exist on the area. Because small animals are abundant in the area, it is also very likely that prairie falcons nest in the area. Peregrine falcons may also use the area as hunting habitat.

7. FISHERIES

The Trail Creek minesite is mainly in ephemeral drainages to Slug Creek. Slug Creek, one of the more important in the area, contains a good fishery of cutthroat and brook trout, sucker, dace, and sculpin. Livestock, however, are causing severe damage to some reaches of Slug Creek.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Agriculture near the Trail Creek site is primarily dry-land small-grain crops grown on a tract about 1 mile southeast of the southern end of the property, at the toe of the north-facing slope of Wolf Mountain and near the Johnson Creek valley bottom. The land along Johnson Creek is used primarily for meadow pasture.

Most of the grazing lands near the proposed mine are privately owned. Between June 21 and September 5, 1,000 sheep are permitted on national-forest and private lands just southeast of the site. About 2,500 sheep months of forage, valued at about $3,900, are consumed annually from these lands. Also, 1,280 acres of adjacent State-owned lands provide 2,130 sheep months of forage, valued at about $3,300 annually. Grazing capacities of lands on the leasehold are similar but generally lower in productivity.

2. SOCIOECONOMIC DEVELOPMENT

The minesite is primarily rangeland.

3. TRANSPORTATION AND UTILITIES SYSTEMS

With the exception of primitive drilling access roads, no transportation or utilities systems cross the Trail Creek site.

4. RECREATION RESOURCES

Near the Trail Creek site, deer hunting is excellent and there is some grouse hunting. Hunters are the most common visitors, and typically stay only a few hours. Snowmobiling and camping are also popular, while motorcycling and fishing are limited. Camping and fishing occur mainly along the Blackfoot River near Slug and Trail Creeks. The number of visitors is moderate to low.

5. ARCHEOLOGIC AND HISTORIC VALUES

In July, 1975, Professor B. Robert Butler, Associate Professor of Anthropology, Idaho State University, conducted an archeologic survey of the leasehold. No archeologic or historic materials were found, and an archeological clearance was recommended.

6. AESTHETICS

The variety class for the Trail Creek area is rated moderate to low. The area falls in the middleground or foreground viewing zones of the Wood Canyon and Slug Creek roads. The aesthetic values of the landscape are enhanced by its undeveloped, natural qualities. Adjacent lands are used primarily as range, and present aesthetic conflicts are minimal.

CHAPTER III
ENVIRONMENTAL IMPACTS

The impacts described in this chapter are based upon mining as originally proposed. At a lesser, more probable rate of mining, as shown in table 1-1a, 12.2 million tons of the 30 million tons will be mined by the year 2000 A.D. By 2000 A.D., there will be 212 acres of pits, 300 acres of dumps, and 90 acres of roads, for a total land disturbance of 602 acres. Mining will likely continue past 2000 A.D. until the estimated 30 million tons of reserves are mined.

A. NATURAL ENVIRONMENT

1. LAND RESOURCES

a. Land Surface

Mining will create 405 acres of pits and 730 acres of dumps, and surface facilities will modify 200 acres. The four pits will range from 2,600 to 10,000 feet in length, 500 to 900 feet in width, and 200 to 300 feet in depth. Waste rock will amount to about 126 million cubic yards.

b. Geology and Mineral Resources

Mining will remove 30 million short tons of phosphate rock containing 720,000 short tons of fluorine, 3,300 short tons of uranium, 24,000 short tons of vanadium, and 30,000 short tons of rare earths. Both phosphate and vanadium will be extracted.

c. Soils

Mining will disturb soils on 1,135 acres at a rate of about 170 acres per year.

2. WATER RESOURCES

a. Water Supply

1. Surface Water

Flows in streams near the Trail Creek site suggest that total flows of 140 cfs or more which would be divided into several channels, could run off the disturbed areas. Water yield could approach 1,200 acre-feet annually, depending on accumulation of snowdrifts on the northeastern slopes. Rates and volumes of surface flows from the dumps will increase. The increased flows will extend further toward Slug Creek than at present. The dumps will drain toward Slug Creek. The pit may also contribute drainage to Slug Creek, if dewatering by pumping is required. This drainage towards Slug Creek will be augmented by flows from waste-dump areas at the proposed Caldwell Canyon mine to the east; however, mining is not expected to be concurrent at the two sites.

2. Ground Water

A large dump at the Trail Creek site will cover two springs. These springs may saturate the dump materials and cause slope failure. This same dump will also cover three stream channels. If these channels are not adequately drained, the dump could fail. Springs discharge at the base of the ridge on which this mine is planned. These springs may be hydraulically connected with perched water bodies on the ridge, and the springflow may diminish or cease if the bodies are drained. If the springs are not related to the perched water, the only impact of the mining on the ground-water system would be drainage of small perched water bodies and possible change in vegetation species.

b. Water Quality

The dumps at the Trail Creek site may erode significantly; sediment may be carried to Slug Creek. Impacts on Slug Creek will be compounded by the proposed Caldwell Canyon mine east of Slug Creek. However, mining will not take place concurrently, and the half mile or more of alluvium between the disturbed areas and Slug Creek will probably prevent silt from reaching the perennial streams.

3. AIR RESOURCES

The proposed mine will not change regional air quality, inasmuch as it will follow mining on the Henry North Continuation. Small amounts of dust and emissions will continue to result.

4. VEGETATION

Mining will progressively remove vegetation on 1,335 acres, of which about 1,035 acres are sagebrush-grass and about 300 acres are conifer-aspen.

5. WILDLIFE

In the Trail Creek area, over 1,000 acres of deer and elk winter range will be destroyed, and migration routes will be disrupted. About 100 deer and as many as 15 elk may be lost. There will be some loss of habitat for bear and moose that may occasionally use the area.

About 1,000 acres of winter habitat for sage grouse will also be destroyed. Some of this habitat is also used by forest grouse and sharptail grouse. As many as several hundred grouse could be lost. Rabbits, moles, mice, ground squirrels, and other small mammals will be displaced from the disturbed area, reducing hunting habitat for raptors, including the prairie falcon.

6. FISHERIES

The Trail Creek mine should have no direct effect on fisheries in Slug Creek. The leasehold includes mainly ephemeral drainages with no fisheries.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Forage will be progressively removed from 1,335 acres of rangeland with an estimated average annual production of about 400 pounds of usable forage per acre, air dry weight. During the life of the mine, about 2,870 sheep months, valued at $4,480 annually, will be lost on at least part of the site.

2. SOCIOECONOMIC DEVELOPMENT

Because they will be developed sequentially and not overlap one another, the Trail Creek, Caldwell Canyon, and Blackfoot Bridge mines will employ a fairly stable work force of about 200. The social and economic impacts to the sites will be minimal and by themselves are not significant, but the cumulative effects of these and other mining proposals will signifiantly impact the regional socioeconomics as described in Part 1.

3. TRANSPORTATION AND UTILITIES SYSTEMS

Assuming rail or conveyor systems are not implemented, the proposed Trail Creek haul road will probably be restricted to ore-transport vehicles during mining. Upon completion of the mining, however, the road may revert to the county road system, improving access to the area. The haul road for the mine will cross the Trail Canyon road, increasing the potential for traffic accidents. The new potential for traffic accidents will decrease, however, with phase out of operations at the North Henry mine and elimination of the Blackfoot River road and Enoch Valley road crossings.

4. RECREATION RESOURCES

The proposed Trail Creek mine will severely decrease hunting opportunities, particularly for deer, and will adversely affect the camping area just northeast of the site. Restricted-use haul roads and other mining-related facilities will reduce opportunities for snowmobiling and other similar recreational uses.

5. ARCHEOLOGIC AND HISTORIC VALUES

No known sites will be impacted.

6. AESTHETICS

The topography near the Trail Creek site will allow development with moderate visual impacts: aesthetic disturbance will be significant within each subdrainage of the site, but the view from the Slug Creek road will be somewhat restricted.

CHAPTER IV
MITIGATING MEASURES

This chapter discusses mitigating measures that apply specifically to the Trail Creek proposal. Mitigating measures that apply generally to the Henry North Continuation, Trail Creek, Caldwell Canyon, and Blackfoot Bridge proposals are discussed in Part 9.1, Chapter IV. These shall be required at this site.

The following stipulation should be imposed as additional mitigating measures for the Trail Creek mine.

A traffic-actuated signal should be installed at the junction between the proposed Trail Creek haul road and the Trail Canyon road to reduce the potential for traffic accidents. An alternative mode of ore transport (railroad or conveyor) might completely mitigate the impact of the haul road on the Trail Canyon road. Sediment control structures should be erected to prevent runoff of sediment into Slug Creek or Trail Creek. Sediment transport should be monitored near the mouth of Trail and Slug Creeks to determine the effectiveness of such structures.

The hazards to mine waste dump stability caused by covering two springs and three drainage channels should be mitigated by constructing adequate drainage facilities as a part of the dump structure.

CHAPTER V
ADVERSE EFFECTS THAT CANNOT BE AVOIDED

At either level of mining, changes in the land surface are unavoidable (fig. 9-8); none of the proposed pits will be backfilled. At the proposed level the mining will create 405 acres of pits and 730 acres of dump. Soils will be disturbed on 1,435 acres at Trail Creek. An unknown amount of sediment will be contributed to Slug Creek from the Trail Creek site.

Mining will ultimately remove vegetation from 1,335 acres, with about 420 to 670 acres cleared at any one time during the life of the mine. Annual forage production on 930 acres of reclaimed land will probably not exceed 300 to 900 pounds per acre, air dry weight--about half the present value. Production on 405 acres of unreclaimed pits will be lost.

On the Trail Creek site, more than 1,000 acres of critical elk winter range will be destroyed, causing the loss of about 15 elk and 100 deer. Consequent overutilization of adjacent deer and elk winter ranges will reduce offsite deer and elk populations. Deer and elk migration routes will be restricted or blocked.

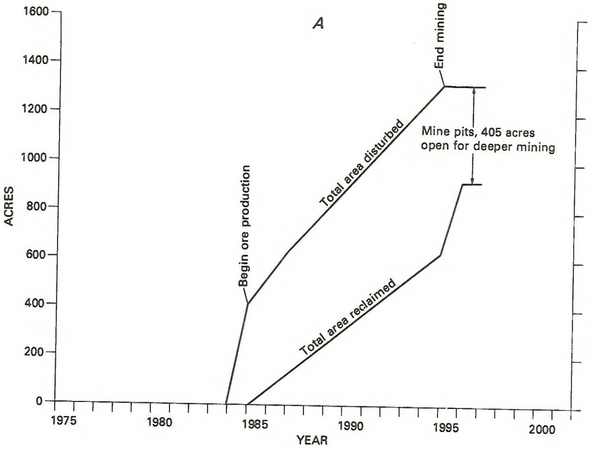
A major critical sage grouse winter range will be altered, as will habitat for sharptail and forest grouse. As many as 200 to 300 grouse could be lost. Over 1,000 acres of the hunting areas of the prairie falcon and other birds of prey will be destroyed.

Impacts on fisheries will probably be minor provided no sediment reaches the streams.

Mining will ultimately remove forage from 1,335 acres of rangeland. Average annual production of usable forage on about 930 acres of reclaimed land will probably not exceed 200 pounds per acre, air dry weight; forage on 405 unreclaimed acres will be almost totally lost.

Trail Creek mine will have moderate aesthetic impact on a relatively undisturbed area.

At the lower, more probable level of mining as shown in table 1-1a, 12.2 million tons will be mined and 602 acres disturbed by 2000 A. D.Mining will likely continue past 2000 A.D. until the 30 million tons have been mined.



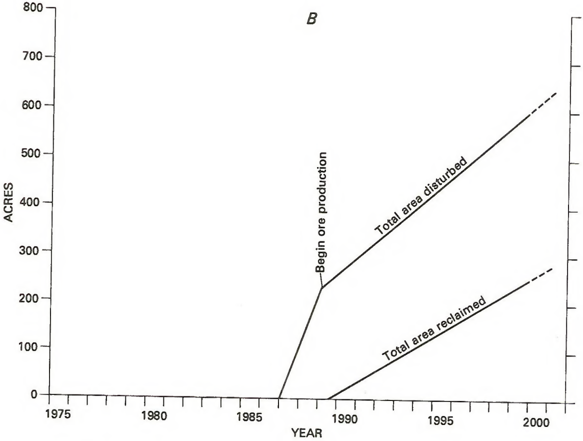


Figure 9-8.—Land disturbance and reclamation, Trail Creek site. *A*, Based on mining plan as submitted for approval. *B*, Based on revised level of mining.

CHAPTER VI
SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

At either level of mining, 30 million short tons of phosphate rock will be removed from the site for processing into elemental phosphorus. Soils will be disturbed on 1,335 acres, and 126 million cubic yards of overburden and bedrock will be moved.

During mining, vegetation will be progressively removed from 1,335 acres; forage production of 600 to 1,800 pounds per acre, air dry weight, will be lost on about 420 to 670 acres at any given time. Wildlife populations will be disrupted. An estimated 100 deer and 15 elk will be displaced to adjacent range which is now at or near carrying capacity.

On the minesite, as many as 2,870 sheep months of forage, valued at $4,480 annually, will be lost during mining, because at least part of the site will not be available for grazing. The aesthetic quality of the area and its recreation resources will be lowered during the mining operation.

Long-term productivity of the 405 acres of pits will be almost totally lost. Annual forage production on 930 acres of reclaimed land will probably not exceed 300 to 900 pounds per acre, air dry weight--about half the present value. Production on 405 acres of unreclaimed pits will be lost. An undetermined long-term reduction of game herds will result from competition on nearby ranges from displaced animals. Average annual production of usable forage on 930 reclaimed acres will probably not exceed 200 pounds per acre, air dry weight; production on 405 unreclaimed acres will be virtually zero. On the entire site, average production of usable forage of about 1,870 sheep months, valued at $2,920, will be lost annually. The landscape changes will have a long-term effect on the aesthetic character of the area by conflicting with the natural landscape and contrasting with the present visual characteristics of the area.

CHAPTER VII
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

At either level of mining, 30 million tons of phosphate rock will be mined and processed. This is irretrievable. This ore includes 720,000 short tons of fluorine, 24,000 short tons of vanadium, 3,300 short tons of uranium, and 30,000 short tons of rare earths. Only the vanadium will be recovered. The landscape change through creation of pits and dumps is largely irreversible. Productivity will be almost totally lost on 405 acres and partially lost on 930 additional acres. Loss of wildlife, to the extent that it cannot successfully relocate, is all irretrievable. The remote, undeveloped character of the area will be irreversibly and irretrievably committed to the intrusion of mining-related changes.

The mining and reclamation will require about 15 million gallons of diesel fuel, 1.2 million gallons of gasoline, and unknown amounts of lubricants, explosives, and electricity during the ten-year mining period.

Processing of the ore into elemental phosphorus will require 31 billion kilowatt-hours of electricity, 2.2 million gallons of diesel fuel, 120,000 gallons of gasoline, 3.6 million tons of coke, 6.9 million tons of silica, 90,000 tons of carbon electrodes, and about 66,000 acre-feet of water.

Secondary recovery of vanadium by Kerr-McGee will require 210,000 tons of limestone and 30,000 each of salt and soda ash.

CHAPTER VIII
ALTERNATIVES

This Chapter considers alternatives that apply specifically to the Trail Creek mining plan. General alternatives that apply to the Henry North Continuation, Trail Creek, Caldwell Canyon, and Blackfoot Bridge, proposals are discussed in Part 9.1, Chapter VIII.

From the Trail Creek minesite, Monsanto proposes to haul ore by railroad, truck, or conveyor. Trucks would follow a private haul road from the north end of the north pit. Two alternative conveyor routes would extend about 10 miles from the pit to the processing plant. If the proposed Slug Creek-Dry Valley rail line is built, a short haul from the pits by scraper or conveyor would probably have less impact than the longer conveyor systems.

The mine waste dump proposed to cover two springs and three stream channels could be relocated to a site that presents fewer stability hazards.

PART 9.3
CALDWELL CANYON MINING PLAN

CHAPTER I
DESCRIPTION OF THE PROPOSED ACTION

The proposed minesite is on the west slope of Schmid Ridge and east of Slug Creek, approximately 14 miles northeast of Soda Springs. The plan involves Federal phosphate leases I-02, I-013738, and I-014080 (fig. 9-9) and 200 acres of privately and federally owned adjacent land; the BLM administers 20 acres of the land off the leaseholds. Surface rights to lease I-02, containing 120 acres, and lease I-013738, containing 212.28 acres, are privately owned. Of the 697.08 acres in I-014080, the BLM administers 160 acres; the rest is privately-owned surface. Total acreage on the leaseholds is 1,029.36; on the entire minesite, about 1,230.

The mining plan does not discuss prospecting, exploration, or past mining. Company officials state that, except for the U.S. Geological Survey trenches, no exploration has been done.

The plan was developed without benefit of exploratory drilling. A development drilling plan, involving 30-holes was filed with the USGS in March 1976. Until this program is accomplished and evaluated the current mining plan is conceptual. It does not contain sufficient engineering details for final consideration of approval or disapproval under Federal Regulation 30 CFR 231. The following details are lacking at this time and will be required for final consideration.

1. Ore quality is not discussed hence degree of resource utilization is not known.

2. Sequence of mining and the location of access slots into the pit are not identified.

3. Mode of ore haulage to the furnace plant at Soda Springs is not identified.

4. The project map depicts the general location of seven-sediment catchment basins and dams, but construction design and capacities are not identified.

5. Power requirements and transmission as well as facilities for workers and machines are not identified.

The following is taken from the mining plan submitted by Monsanto Company to the Conservation Division, U.S. Geological Survey, Pocatello, Idaho, on December 20, 1974, and from interviews with company officials.

A. PROPOSED MINING OPERATIONS

The phosphatic outcrop trends northwestward through the leaseholds. The ore beds dip 0^o in the south to 60^o in the north. The two ore beds are separated by middle waste shales.

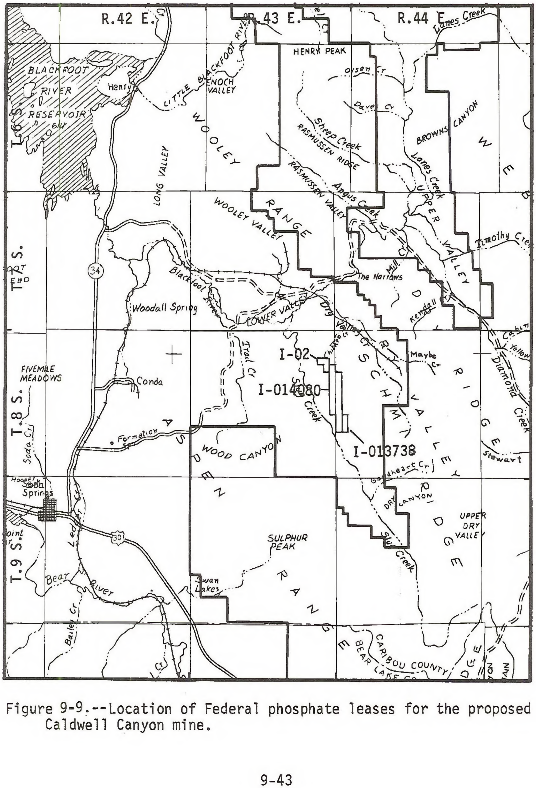


Figure 9-9.--Location of Federal phosphate leases for the proposed Caldwell Canyon mine.

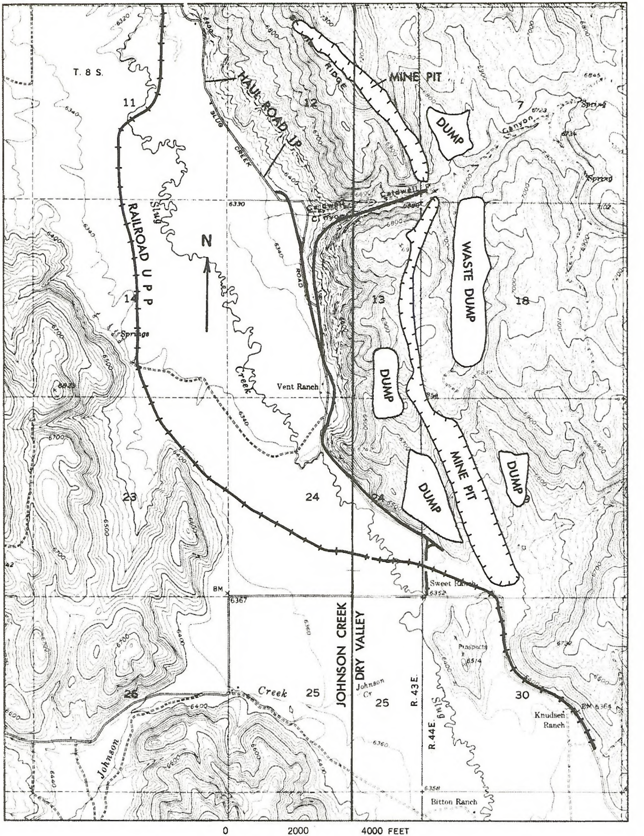


Figure 9-10.--Mining plan proposed for the Caldwell Canyon site.

Mining will be open pit. Although the mining plan discusses a single pit, the plan map and sections show two pits, one north of Caldwell Canyon, and the other south. Caldwell Canyon bisects the north part of the leasehold and drains westward through it. Overburden will be placed east of the north pit and on each side of the south pit (fig. 9-10). At a stripping ratio of 3:1, the mine will yield about 12 million tons of ore from 1995 through 1998. About 50 million cubic yards of waste rock will be placed in dumps. The plan provides for mining to the present economic stripping ratio. Well-altered ore continues downdip from the floor of the pit, as designed. At the completion of mining, the pits will be about 17,500 feet long and 400 to 800 feet wide. The mining plan does not propose backfilling; but since filing the plan, the company has indicated the possibility of backfilling if unaltered ore is reached within the then-current stripping ratio. The plan does not provide for stockpiling of marginal ore and does not specify sequence of mining.

Mining methods will be the same as those at the present Henry Mine. The area will be cleared of vegetation, which will be burned or compacted and covered with waste rock. The overburden will be removed by rubber-tired scrapers pushloaded by crawler dozers. Overburden will be drilled and blasted as necessary. The ore will be selectively mined in 15-foot lifts through the length of the pits by rubber-tired scrapers and dozers, and the ore delivered by scrapers to truck-loading tipples.

The Rex Chert overburden and Wells Limestone waste will be removed during the winter. Middle waste shales will be removed during the summer concurrently with mining of the ore. Ore would not be mined or hauled during the winter. The ore will be transported to the Monsanto plant by truck or possibly by rail.

The pit walls will be benched, and the top of the walls protected by a ditch and bench. A sign-posted wire fence will give additional protection.

B. RECLAMATION

Topsoil, where thick enough to merit recovery, will be removed from pit areas and stockpiled separately from waste, for use in revegetation. Topsoil storage areas are not indicated. Monsanto states that its experience at the Henry Mine has shown that the middle waste shales support plant growth. This material will be used primarily in revegetation.

Overburden disposal piles are designed and so scheduled that coarse rock will be placed in the interior and the surface covered with the waste shale or topsoil. The waste piles will be contoured and benched on those faces with more than 50 feet of vertical relief. Overall slopes will not exceed 30° (1.7:1). Pit-wall benches will be covered with at least 1 foot of topsoil or waste shale and will be planted at the appropriate time.

Service areas will be scarified and otherwise prepared and planted during the first spring after cessation of mining.

Where water might flow, rock will be placed to provide erosion-free channels. The plan shows the location of seven catchment basins as well as construction details of the catchment dams. Sizes of the catchment basins are not given.

Of the 1,030 acres on the leaseholds or 1,230 total acres at the minesite, 705 acres will be disturbed: 195 acres by mine pits, 335 acres by waste dumps, 80 acres by roads, and 95 acres by safety and water-control measures.

C. SURFACE FACILITIES

The plan does not discuss mine-support facilities. The mine-plan map shows the pit-access roads and a relatively short segment of the haul road. It does not specify the exact locations of two loading tipples; presumably a tipple will serve each pit.

Raw ore will be trucked over private road to their Monsanto's processing plant at the Soda Springs. Company officials do not preclude rail transport if a regional rail system is built (see part 3).

CHAPTER II
DESCRIPTION OF THE EXISTING ENVIRONMENT

A. NATURAL ENVIRONMENT

1. CLIMATE

The general climate of the area is described in Part 1.

Temperatures at the minesite average a few degrees lower than those at Conda, and the growing season is shorter. Precipitation is about 19 inches. Snow may accumulate to greater depths than at Conda because of lower temperatures. Prevailing winds probably tend to clear most of the site, but some drifting may occur on the north end of the south pit.

2. LAND RESOURCES

a. Land Surface

The minesite is on the west side of Schmid Ridge, which forms the east side of Slug Creek valley (fig. 9-10). The mine area extends about 3 miles along Schmid Ridge. The relief between Schmid Ridge and Slug Creek valley is a little over 1,000 feet. Caldwell Canyon bisects the mine area.

b. Geology and Mineral Resources

At the Caldwell Canyon minesite, beds of the Meade Peak strike about N. 20° W., and dip northeast at a wide range of angles. Faults locally offset the Meade Peak, and a major longitudinal fault cuts off the Meade Peak not far east of the proposed mining limits.

The Meade Peak is about 140 feet thick, and the upper and lower phosphate zones total 32 feet. The company plans to produce 12 million short tons of phosphate rock, which will include 290,000 short tons of fluorine, 1,300 short tons of uranium, 9,600 short tons of vanadium, and 12,000 short tons of rare earths.

c. Soils

Landtype associations 1 and 4 occur on the site; their distribution is shown in figure 9-11, and their soil characteristics are given in table 9-3. They are described in Part 1, Ch. II. About 12 percent is in landtype association 1, and about 88 percent in landtype association 4.

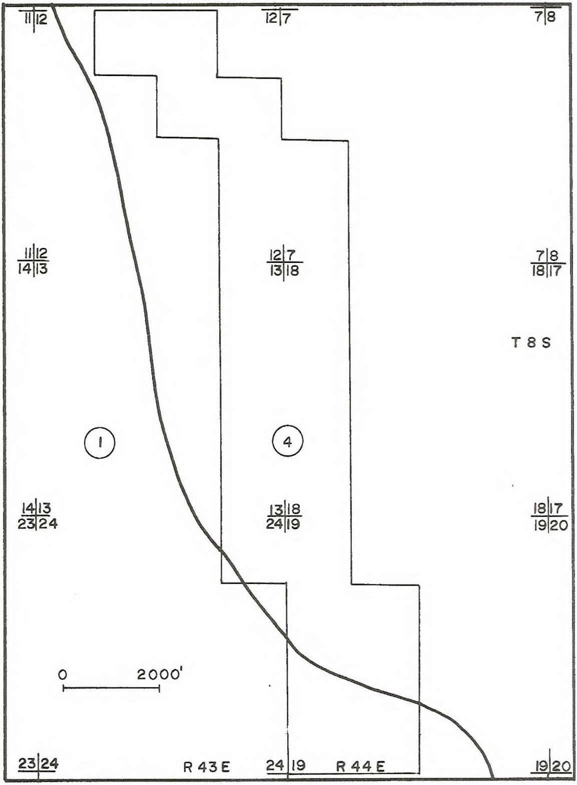


Figure 9-11.--Landtype associations near the Caldwell Canyon site.

Table 9-3.--Physical characteristics of soils at Caldwell Canyon minesite. VL = very low, L = low, M = moderate, H = high, VH = very high

Landtype Assn.	Soil families	Erosion in inches per year	Topsoil potential: Depth, in inches	Topsoil potential: Suitability	Available water capacity	Mass failure hazard	Road construction hazards	Slope range, in percent	Revegetation potential
1	Cryic Pachic Paleoborolls, fine-loamy, mixed	0.005	10	M	9.2	VL	VL	10-25	VH
	Pachic Cryoborolls, loamy-skeletal, mixed	.001	12	H	4.3	VL	L	1-10	VH
	Cumulic Cryaquolls, fine-loamy, mixed	.000	15	L	3.7	VL	L	0-2	VH
4	Pachic Cryoborolls, loamy-skeletal, mixed	.001	12	H	4.3	VL	L	1-10	VH
	Argic Pachic Cryoborolls, fine, montmorillonitic	.015	12	M	9.0	M	M	25-45	M
	Cryic Pachic Paleoborolls, fine, montmorillonitic	.015	12	M	9.0	M	M	20-40	M
	Argic Cryoborolls, fine, montmorillonitic	.015	8	L	8.0	M	M	25-45	M

3. WATER RESOURCES

a. Water Supply

1. Surface Water

The stream in Caldwell Canyon is perennial at the minesite; it flows west about half a mile, and sinks into the alluvium before reaching Slug Creek. An intermittent tributary to this stream will be covered by a dump. The drainage basin above this point is about 80 acres. Accumulation of snow will probably be small on the ridge and southern exposures, with low runoff and water yield. Soil moisture at the dump site probably depletes rapidly because of the southern exposure. The dumps for the south pit will cover intermittent streams that drain basins totaling nearly 1 square mile, and the largest dump will straddle a north-facing draw for about 0.8 mile and cover a spring.

2. Ground Water

Most of the Caldwell Canyon mine will be on spurs of Schmid Ridge that contain little ground water. The proposed pit area iscrossed by Caldwell Creek, which is perennial and is fed by several springs issuing from the Dinwoody Formation. The Rex Chert and perhaps the Meade Peak Members of the Phosphoria probably contain water near the creek. The south end of the pit will be only 30 feet above Slug Creek; the Wells Formation and the Phosphoria may contain water at this level. The Wells Formation is probably dry in the higher parts of the ridge.

b. Water Quality

Slug Creek joins the Blackfoot River about 2 miles northwest of the proposed Caldwell Canyon mine, and their water quality is probably similar. Data for the Blackfoot River above the Blackfoot River Reservoir are given in Part 1; recent analyses of trace elements are given in Part 9.1. The water at this minesite is comparable in quality.

4. AIR RESOURCES

The air quality near the proposed mine is good. Present mining near the site produces particulates estimated at 0.5 pound per ton of ore. Dust and emissions result from road traffic.

5. VEGETATION

At the Caldwell Canyon site, about 170 acres of the 1,029-acre Federal leaseholds are covered by conifer-aspen. The conifers include Douglas fir, but not in commercial quantity. Riparian cover, mostly willows and sedges, grows in a narrow belt of about 12 acres along the south side of the trail through Caldwell Canyon. The remaining 850 acres are covered by sagebrush-grass. Forage production is 600 to 2,000 pounds per acre, air dry weight. No rare or endangered plant species are known to be present on the site.

6. WILDLIFE

The Caldwell Canyon area includes critical winter range for elk. About 60 elk migrate here during the winter, some from the Dry Valley area. A few deer, perhaps 25 or less, use the area in spring, summer, and fall; the mining operation, however, will block a deer migration route.

Moose range here during the winter. However, moose tend to cover rather large areas, and 10 to 20 moose might cross the site in search of forage during any given winter. This area is also probably within the seasonal home range of at least a few black bear and mountain lion.

Coyotes, badgers, bobcats, red fox, skunks, and weasels are relatively common.

Two of the more significant raptors include the golden and bald eagles, which hunt and possibly nest here.

The area is a critical winter range for sage grouse. In 1972, a major strutting ground on the leasehold had a population of 30 cocks. Blue grouse winter here and nest in the spring, as do ruffed grouse.

A few beavers inhabit the canyon bottom. Small mammals include ground squirrels, cottontails, jack rabbits, mice, moles, and occasional snowshoe hares.

Reptiles and amphibians common to the region are present, as is the spadefoot toad.

No threatened or endangered species have been observed on the minesite.

7. FISHERIES

The minesite is mainly in ephemeral drainages to Slug Creek, which contains a good fishery, comprising cutthroat and brook trout, sucker, dace, and sculpin. Livestock, however, are causing severe damage to some reaches. There are no continuous fisheries, and usually no fisheries in the ephemeral drainages.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Agricultural crops are grown in Slug Creek valley about half a mile west of the Caldwell Canyon site. Land along Slug Creek is primarily meadow pasture. Dry farmland produces small-grain crops about 1 mile southwest of the mine.

Between May 16 and September 30, 3,000 sheep are permitted on 120 acres of national-resource lands in conjunction with privately owned land. Between June 10 and October 20, 270 cattle are permitted on 40 acres of national-resource lands in conjunction with privately owned land. Annual harvest is 120 sheep days, valued at about $6, and 8 AUM's, valued at about $47.

2. SOCIOECONOMIC DEVELOPMENT

The minesite is rangeland.

3. TRANSPORTATION AND UTILITIES SYSTEMS

About 1 mile of the Caldwell Canyon road crosses the Caldwell Canyon site.

4. RECREATION RESOURCES

Primary recreation uses are deer and elk hunting, backpacking, horseback trips, nearby fishing, and some snowmobiling and ORV use. It is possible to use the proposed site for recreation year-round; however, fall usually attracts the most activity, especially hunting and firewood gathering. No facilities have been developed primarily for recreation, so recreation uses have conformed to the utility roads and more moderate terrain of the site. The number of visitors to the site is moderate to low. Hunters are the most common visitors. Recreation visitors normally stay only a few hours.

5. ARCHEOLOGIC AND HISTORIC VALUES

In July, 1975, Professor B. Robert Butler, Associate Professor of Anthropology, Idaho State University, conducted an archeologic survey of the leasehold. No archeologic or historic materials were found, and an archeological clearance was recommended.

6. AESTHETICS

The visual variety class for the Caldwell Canyon area is moderate. The area falls in the foreground and middleground viewing zones of Slug Creek road which runs along the west edge of the proposal area. Low standard utility roads also penetrate the area allowing detailed observation.

CHAPTER III
ENVIRONMENTAL IMPACTS

The impacts described in this chapter are based upon the mining plan as originally submitted. Based upon a more probable level of production, as shown in table 1-1a, these impacts will not occur until well after the year 2000 A.D.

A. NATURAL ENVIRONMENT

1. LAND RESOURCES

a. Land Surface

Mining will create 195 acres of pit and 335 acres of dumps on the Federal leaseholds, and surface facilities will modify 175 acres. The pit will be 17,500 feet long, 400 to 800 feet wide, and possibly more than 360 feet deep. Waste rock will total about 50 million cubic yards.

b. Geology and Mineral Resources

Mining will remove 12 million short tons of phosphate rock containing 290,000 short tons of fluorine, 1,300 short tons of uranium, 9,600 short tons of vanadium, and 12,000 short tons of rare earths. Both phosphate and vanadium will be extracted.

c. Soils

Mining will disturb soils on 705 acres, at a rate of about 100 acres per year.

2. WATER RESOURCES

a. Water Supply

1. Surface Water

Data available for the Caldwell Canyon area do not permit estimates of volumes or rates of flows during or after mining, but flows as much as 50 cfs could develop at either end of the south pit and dumps if all flows were concentrated into one outlet. Volumes could total 300 to 500 acre-feet per year. It is likely high flows and sediment now reach Slug Creek from Caldwell Canyon, and will reach Slug Creek as a result of mining. Since some of the south pit would be below the level of Slug Creek if it reaches a 360-foot depth, pumping to dewater the pit would further alter flow characteristics in Caldwell Canyon and add to turbidity and sediment transport of streams.

2. Ground Water

The south end of the Caldwell Canyon pit will be below the level of Slug Creek; ground water may seep into the pit from the creek alluvium. Dewatering the alluvium could reduce the flow of Slug Creek along the pit, but the reduction would probably be small. One of the proposed dumps at this site will cover a spring. Seepage from the spring may saturate the dump material and cause slope failure. Ground water may be drained from the Phosphoria near Caldwell Creek and, in negligible amounts, from small perched-water bodies.

b. Water Quality

Impacts on Slug Creek will be compounded by the proposed Trail Creek mine west of Slug Creek. However, mining will not take place concurrently. Moreover, the half mile or more of alluvium between the disturbed areas and Slug Creek, while providing a buffer zone, may not prevent silt from reaching perennial streams.

3. AIR RESOURCES

The proposed mine will not change regional air quality inasmuch as it will be a continuation of mining at Trail Creek. Small amounts of dust and emissions will continue to result.

4. VEGETATION

Mining will progressively remove vegetation from 705 acres, of which about 590 acres are sagebrush-grass, 115 acres are conifer-aspen, and the few remaining acres are riparian.

5. WILDLIFE

The Caldwell Canyon mining area is almost totally on elk winter range. It will displace elk on 705 acres and could displace them from an adjacent area of 4 square miles--about one-third of the critical winter elk range in the region. About 60 elk will be lost. Loss of habitat will eliminate some spring, summer, and fall range and cause the loss of perhaps 25 deer. Deer migration routes from Dry Valley to Slug Creek will be blocked. The impact on moose will be negligible. Some black bear and mountain lion habitat will be lost, but the effect will be small. Reduction or loss of small mammals, including rodents, will reduce the prey area for raptors. Over 500 acres of critical winter range for sage grouse will be destroyed; a nearby strutting ground may be affected. Forest grouse will be displaced from the area by removal of small pockets of timber. As many as 250 grouse could be lost. Small numbers of reptiles and songbirds will be lost.

6. FISHERIES

Sediment from the Caldwell Canyon mine will moderately affect fisheries in Slug Creek and downstream. The minesite includes mainly ephemeral drainages.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Mining will progressively remove forage from 705 acres of rangeland with an estimated average annual production of about 500 pounds of usable forage per acre, air dry weight. During the life of the mine, about 405 AUM's, valued at $2,390 annually, will be lost on at least part of the site; some additional forage may be lost on adjacent lands.

2. SOCIOECONOMIC DEVELOPMENT

Because they will be developed sequentially and not overlap one another, the Trail Creek, Caldwell Canyon, and Blackfoot Bridge mines will employ a fairly stable work force of about 200. The social and economic impacts to the sites will be minimal and by themselves are not significant, but the cumulative effects of these and other mining proposals will significantly impact the regional socioeconomics as described in Part 1.

3. TRANSPORTATION AND UTILITIES SYSTEMS

Assuming rail or conveyor systems are not implemented, the proposed Caldwell Canyon haul road will probably be restricted to ore-transport vehicles during mining. Upon completion of the mining, however, the road may revert to the county road system, improving access to the area.

4. RECREATION RESOURCES

The Caldwell Canyon mine will severely decrease hunting opportunities, particularly for big game, and will reduce the quality of horseback riding, snowmobiling, and driving for pleasure.

5. ARCHEOLOGIC AND HISTORIC VALUES

No known site will be impacted.

6. AESTHETICS

The topography near the Caldwell Canyon site will allow development with minimum visual impacts. Aesthetic disturbance will be locally significant but the view from the Slug Creek road will be somewhat restricted.

CHAPTER IV
MITIGATING MEASURES

This chapter discusses mitigating measures that apply specifically to the Caldwell Canyon proposal. Measures that apply generally to the Henry North Continuation, Trail Creek, Caldwell Canyon and Blackfoot Bridge proposals are discussed in Part 9.1, Chapter IV. These shall be required at this site.

On the Caldwell Canyon site, alternative dump sites should be selected to avoid covering stream channels. Observation wells should be installed in the alluvium along Slug Creek near the south end of the south pit to monitor water-level fluctuations associated with mining. Degradation of riparian habitat in Caldwell Canyon should be held to a minimum.

CHAPTER V
ADVERSE EFFECTS THAT CANNOT BE AVOIDED

At either level of mining, changes in the land surface are unavoidable (fig. 9-12); neither of the proposed pits will be backfilled. The proposed mining will thus create 195 acres of pits and 335 acres of dumps. Soils will be disturbed on 705 acres, An unknown amount of sediment will be contributed to Caldwell Canyon and possibly Slug Creek from the Caldwell Canyon site.

Mining will ultimately remove vegetation from 705 acres, with about 300 to 400 acres cleared at any one time during the life of the mine. Annual forage production on 510 acres of reclaimed land will probably not exceed 300 to 1,000 pounds per acre, air dry weight--about half the present value. Production on 195 acres of unreclaimed pits will be lost.

On and near the Caldwell Canyon site, at least 700 acres of critical elk winter range will be unavoidably destroyed, and as many as 60 elk will be lost. About 25 deer and a few moose will also be lost. Migration routes of both deer and elk will be blocked. Fur bearers will significantly decline.

One strutting ground for sage grouse will be unavoidably altered, as will some nesting and brood-rearing habitats. The sage-grouse population will be significantly reduced, and 500 acres of critical winter range will be unavoidably destroyed. Forest-grouse and other bird populations will also be significantly reduced. The overall reduction in numbers of small mammals, songbirds, reptiles, and amphibians will reduce hunting by raptors and other predatory species.

Impacts on fisheries will probably be minor.

Forage will ultimately be removed from 705 acres of rangeland. Average annual production of usable forage on about 510 acres of reclaimed land will probably not exceed 250 pounds per acre, air dry weight; forage on 195 unreclaimed acres will be almost totally lost.

The mine will have moderate aesthetic impact on a relatively undisturbed area.

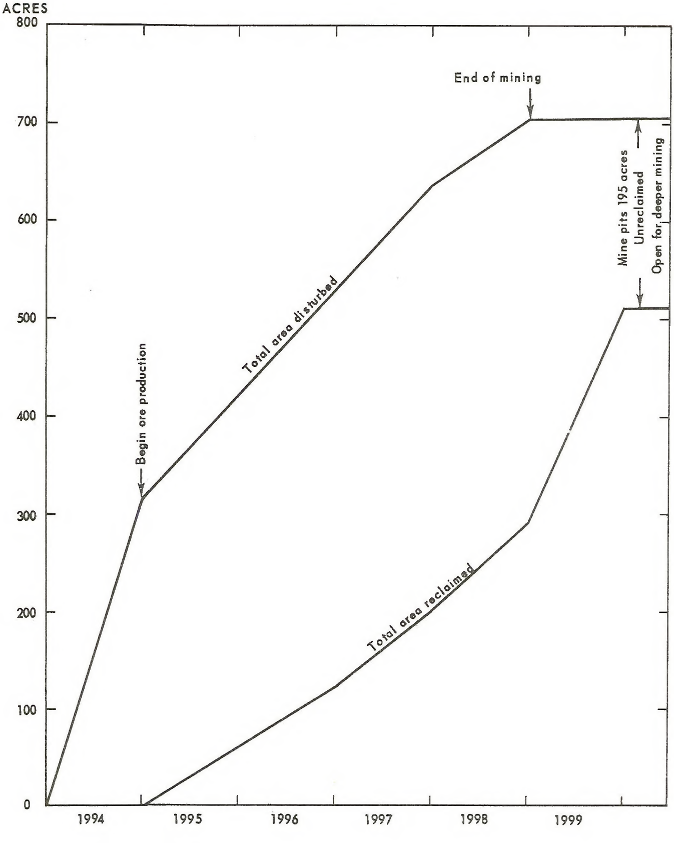


Figure 9-12.--Land disturbance and reclamation, Caldwell Canyon site.

CHAPTER VI
SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

At either level of mining, about 12 million short tons of phosphate rock will be removed from the minesite for processing into elemental phosphorus. Soils will be disturbed on 705 acres and 50 million cubic yards of overburden and bedrock will be moved.

During mining, vegetation will be progressively removed from 705 acres; forage production of 600 to 2,000 pounds per acre, air dry weight, will be lost on about 300 to 400 acres at any given time. About 60 elk and about 25 deer will be displaced to adjacent ranges already at or near carrying capacity. On the minesite, about 405 AUM's or forage, valued at $2,390 annually, will be lost during mining, because at least part of the site will not be available for grazing. The aesthetic quality of the area and its outdoor recreation opportunities will be diminished during mining.

Annual forage production on 510 acres of reclaimed land will probably not exceed 300 to 1,000 pounds per acre, air dry weight--about half the present value. Production on 195 acres of unreclaimed pits will be lost. Some long-term reduction in game herds, especially elk, will result from competition on nearby ranges from the displaced animals. Average annual production of usable forage on 705 reclaimed acres will probably not exceed 250 pounds per acres, air dry weight; production on 195 unreclaimed acres will be virtually zero. On the entire site, average production of usable forage of about 200 AUM's, valued at $1,180, will be lost annually. The land surface changes will have long-term effects upon the aesthetic character of the area by conflicting with the natural landscape and contrasting with its visual character.

CHAPTER VII
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

At either level of mining, about 12 million tons of the estimated 1 billion tons of reserves in southeastern Idaho will be mined and processed. This is irretrievable. This ore includes 290,000 short tons of fluorine, 9,600 short tons of vanadium, 1,300 short tons of uranium, and 12,000 short tons of rare earths. Only the vanadium will be recovered. The landscape change through creation of dumps and pits is largely irreversible. Productivity will be almost totally lost on 195 acres and partially lost on an additional 510 acres. Loss of wildlife, to the extent that it cannot relocate successfully on adjacent ranges, is also irretrievable. The remote, undeveloped character of the area will be irreversibly and irretrievably committed to the intrusion of mining-related changes.

The mining and reclamation will require about 6.0 million gallons of diesel fuel, 480,000 gallons of gasoline, and unknown amounts of lubricants, explosives, electricity, and construction materials.

Transporting the ore will require 880,000 gallons of diesel fuel.

Processing of the ore into elemental phosphorus will require 12.0 billion kilowatt hours of electricity, 48,000 gallons of gasoline, 1.4 million short tons of coke, 2.8 million short tons of silica, 36,000 tons of carbon electrodes, and about 16,000 acre-feet of water.

Secondary recovery of vanadium by Kerr-McGee will require 84,000 tons of limestone and 12,000 tons each of salt and soda ash.

CHAPTER VIII
ALTERNATIVES

This chapter discusses alternatives that apply specifically to the Caldwell Canyon mining plan. General alternatives that apply to the Henry North Continuation, Trail Creek, Caldwell Canyon, and Blackfoot Bridge proposals are discussed in part 9.1, chapter VIII.

From the Caldwell Canyon site, Monsanto proposes to truck ore on a private haul road. The proposed pits are generally less than a mile from the proposed railroad west of Slug Creek and generally less than half a mile from the alternative spur east of Slug Creek. If the railroad is built, a short conveyor or truck haul from the pit to the railroad would probably have less impact than the haul road, especially if the railroad hauls from several other mines.

PART 9.4
BLACKFOOT BRIDGE MINING PLAN

CHAPTER I
DESCRIPTION OF THE PROPOSED ACTION

The proposed project is on the east slope of the Aspen Range about 10 miles north of Soda Springs. The plan involves Federal phosphate leases I-05613 and I-013709 (fig. 9-13) and private fee-owned land adjacent to the leaseholds. Of the 520 acres of lease I-05613, 80 acres are State owned, 40 acres are administered by the BLM, and 400 acres are privately owned. The 80 acres of Lease I-013709, are equally divided into private land and Federal land managed by the BLM. An additional 360 acres of private land bordering the east and west lease boundaries are also included in the mining plan.

The mining plan as submitted is conceptual and does not contain sufficient engineering detail for final consideration of approval or disapproval under Federal Regulation 30 CFR 231. The following details were lacking at this time and will be required.

1. Exploratory drilling and trenching necessary for development of a complete mine plan are lacking.

2. Sequence and schedule of mining are not identified.

3. Ore grade is discussed only in broad terms; hence the degree of resource utilization is unknown.

4. Design and location of load out facilities for truck haulage to furnace plant are lacking.

5. The placing of waste dumps on the down dip projection of the ore beds is questionable.

6. Power generation or transmission not identified.

7. Groundwater conditions are unknown. Due to close proximity of Blackfoot River and several intermittent tributaries a ground and surface water study should be included in the plan.

8. The general location of sediment catchment basins are shown but site specific design and capacities are not identified.

The plan does not discuss past mining, development drilling, or other prospecting.

The following is taken from the mining plan prepared and submitted by Monsanto Company to the Conservation Division, U.S. Geological Survey, Pocatello, Idaho, on December 26, 1974, and from interviews with Company officials.

A. PROPOSED MINING OPERATION

The Phosphoria outcrop at the site strikes northwest and dips

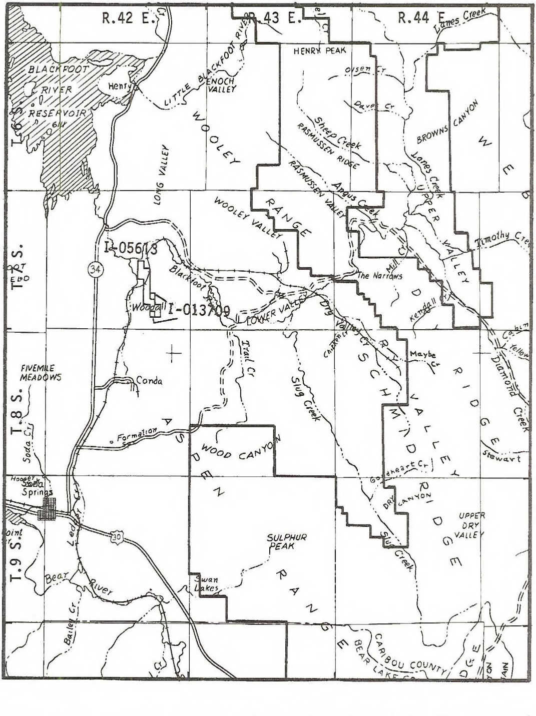


Figure 9-13.--Location of Federal phosphate leases for the proposed Blackfoot Bridge mine.

25° to 80° northeast, with dips steepening to the south. The present haul-road from the Henry mine to the Monsanto plant crosses a low saddle just north of the center of the leasehold. Two open pits will be developed, one north and one south of the haul-road (figs. 9-14 and 9-15). Ore will be mined along about 2¼ miles of the strike. The beds contain two definite zones of furnace-grade rock. Ore grade is not stated in the plan.

At a stripping ratio of 3:1, the mine will yield about 6 million tons of ore, and dumps will comprise about 25 million cubic yards of expanded waste rock. At this stripping ratio, weathered ore will remain below the pit bottom at the cessation of mining. Proposed startup date and annual rate of production are not stated in the plan but an interview with company officials indicated that the mine will be depleted within 2 years of a projected startup date around 1999; although the active-mining period thus extends beyond the cutoff date of 2000 for this study, figures presented henceforth in this part of the statement are based on total development because the mine plan provides no guidelines concerning probably sequential development of the mine, and, therefore, it is impossible to determine how much land and resources will be affected during the 1-year mining period before the cutoff.

Mining procedure will be the same as that at the Henry mine. Generally, the overlying Rex Chert and underlying Wells Limestone will be drilled and blasted during the winter. The shale overburden and interbedded low-grade phosphate beds will be removed during the warm months, concurrently with mining. Ore will be trucked over the present haul road. Overburden will be removed by rubber-tired scrapers, and push-loaded by crawler dozers. Overburden will be drilled and blasted as required. Topsoil, where thick enough, will be stockpiled. Exposed ore will be selectively mined by rubber-tired scrapers and dozers, using slope boards, and delivered by scrapers to the two truck-loading tipples. The plan does not propose stockpiling of marginal ore. The plan states that the soft weathered ore and the surrounding incompetent beds at depths greater than the current stripping ratio can only be mined by surface methods.

The mine pit provides for a benched wall in both the Rex Chert hanging wall and the Wells limestone footwall. The deepest pit floor is at an altitude of 6,080 feet in the southern area of the south pit. The deepest floor of the north pit is approximately at an altitude of 6,090 feet.

The dumps will be designed so that coarse rock will be placed in the interior, and the surface will be covered with topsoil or, more likely, the waste shale between the ore zones. The dump faces will be benched at each 50-foot vertical rise. Overall slopes will not exceed 30° (1.7:1 slope).

B. RECLAMATION

Backfilling the pits is not proposed. Pit-wall benches and waste-dump surface will be covered with at least 1 foot of topsoil or

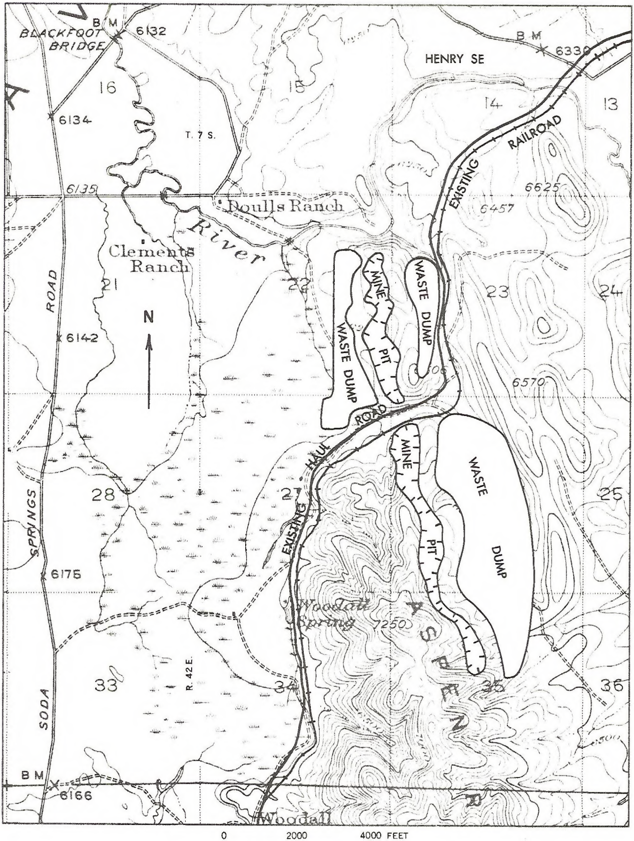


Figure 9-14.--Mining plan proposed for the Blackfoot Bridge site.

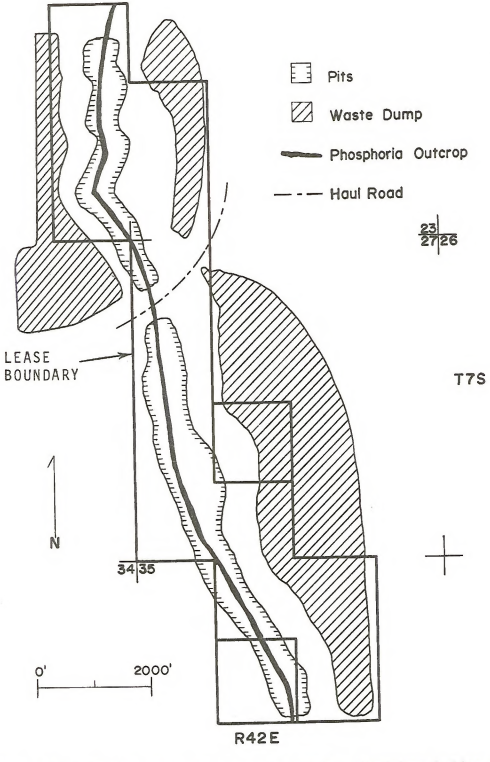


Figure 9-15.--Mining sequence proposed for the Blackfoot Bridge mine.

waste shale and planted at the appropriate time. The mining area will be cleared of vegetation, which will be burned or compacted and buried in waste dumps. After an area becomes inactive, it will be scarified and prepared for planting, ordinarily during the next spring.

Seven sediment-catchment basins will be built. Pit walls will be protected from erosion by ditches.

Of the 600 acres on the leaseholds or 960 total acres at the minesite, 650 acres will be disturbed: 135 acres by mine pits, 395 acres by waste dumps, 60 acres by roads, and 60 acres by safety and water-control structures. Parts of the dumps will be on adjacent private land.

C. SURFACE FACILITIES

The plan does not discuss surface facilities.

Raw ore will be trucked over Monsanto's private road to their processing plant at Soda Springs.

CHAPTER II
DESCRIPTION OF THE EXISTING ENVIRONMENT

A. NATURAL ENVIRONMENT

1. CLIMATE

The general climate of the area is described in Part 1.

Temperatures at the minesite average a few degrees lower than those at Conda, and the growing season is shorter. Precipitation is about 19 inches. Snow may accumulate to greater depths than at Conda because of lower temperatures. Prevailing winds tend to clear the west slopes and the ridge crests and produce drifts on the east-facing slopes.

2. LAND RESOURCES

a. Land Surface

The minesite is at the north end of the Aspen Range, on the northeast side of Woodall Mountain and on a small ridge extending north of the mountain (fig. 9-14). The ridge abuts on the Blackfoot River, and the valley of the Blackfoot extends eastward. The Blackfoot Lava Field is west of the ridge. The mine area ranges in altitude from about 6,850 to 6,200 feet; the lowest point on the minesite is about 100 feet above the adjacent valley floor.

b. Geology and Mineral Resources

On the Blackfoot Bridge site, outcrops of the Meade Peak extend about 2 miles along the ridge, and the beds strike generally N. 20° W. and dip 25°-80° NE. The beds are part of the west limb of the Trail Creek syncline. In the northern part of the site, a fault has moderately offset the Meade Peak eastward on the north side of the fault, and a longitudinal fault cuts out the Meade Peak at the surface in the southern part of the area.

The Meade Peak is about 180 feet thick; the upper and lower ore zones total 50 feet. The company plans to produce 6 million short tons of phosphate rock, which will include 140,000 short tons of fluorine, 660 short tons of uranium, 4,800 short tons of vanadium, and 6,000 short tons of rare earths.

c. Soils

Landtype associations 1, 4, and 11 occur on the site; their distribution is shown in figure 9-16, and their soil characteristics are given in table 9-4. They are described in Part 1, Chapter II. About 2 percent of the area is landtype association 1, about 69 percent landtype association 4, and 29 percent landtype association 11.

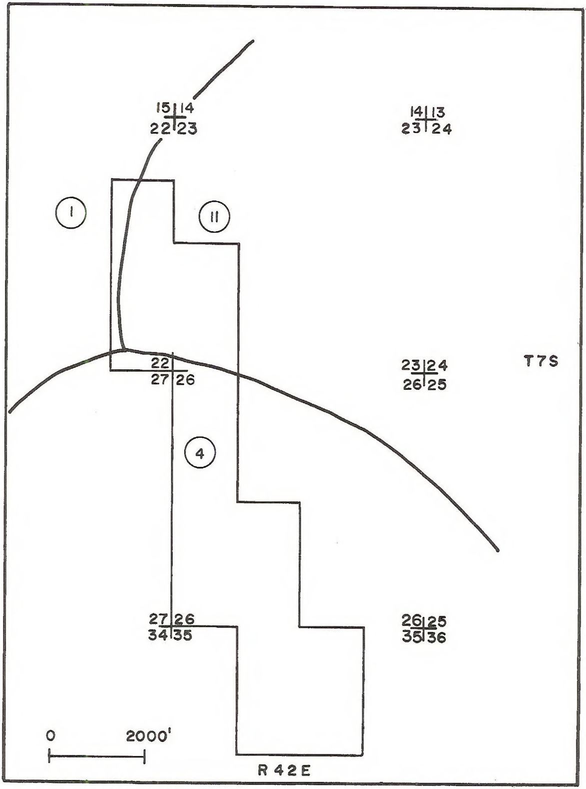


Figure 9-16.--Landtype associations near the Blackfoot Bridge site.

Table 9-4.--Physical characteristics of soils at Blackfoot Bridge minesite. VL = very low, L = low, M = moderate, H = high, VH = very high

Landtype Assn.	Soil families	Erosion in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road construction hazards	Slope range, in percent	Revegetation potential
			Depth, in inches	Suitability					
1	Cryic Pachic Paleoborolls, fine-loamy, mixed	0.005	10	M	9.2	VL	VL	10-25	VH
	Pachic Cryoborolls, loamy-skeletal, mixed	.001	12	H	4.3	VL	L	1-10	VH
	Cumulic Cryaquolls, fine-loamy, mixed	.000	15	L	3.7	VL	L	0-2	VH
4	Pachic Cryoborolls, loamy-skeletal, mixed	.001	12	H	4.3	VL	L	1-10	VH
	Argic Pachic Cryoborolls, fine, montmorillonitic	.015	12	M	9.0	M	M	25-45	M
	Cryic Pachic Paleoborolls, fine, montmorillonitic	.015	12	M	9.0	M	M	20-40	M
	Argic Cryoborolls, fine, montmorillonitic	.015	8	L	8.0	M	M	25-45	M
11	Cryic Pachic Paleoborolls, fine-silty, mixed	.004	12	H	9.6	VL	VL	10-20	VH
	Argic Pachic Cryoborolls, fine-silty, mixed	.017	10	H	9.6	VL	M	30-40	M

3. WATER RESOURCES

a. Water Supply

1. Surface Water

Annual water yield from precipitation is estimated to be 12 inches, but may vary considerably depending on snowdrift patterns.

A dump east of the north pit will lie on the slope just over the ridge from the mine pit with the north end a few hundred feet upslope from a small spring fed channel which flows north into the Blackfoot River. A dump west of the north pit will be downslope from the pit along the edge of a marsh. These dumps will be designed to prevent encroachment on the marsh and stream channels.

The south pit will begin a few hundred yards south of the north pit and extend southeastward about 1½ miles along the steep east slope of the Aspen Range. The dump will be downslope from the pit and will drain into an intermittent stream which flows north then west into the marsh west of the north pit. Characteristics of the adjacent streams are unknown. Marshland and springs occur along the Blackfoot River to the north and to the west of the minesite indicating considerable groundwater and possibly unstable foundations north and west of the site.

Most precipitation probably infiltrates into the ground, but distribution between surface water and ground water is not known. Pits will be excavated below levels of springs, streams and marshes for considerable distances.

2. Ground Water

Drill-hole data indicate no significant quantities of water in the formations to be worked in the Blackfoot Bridge mine. The mining plans indicate that two pits will be dug to a depth slightly below the nearby swamps and Blackfoot River. Some fractures in the Wells Formation, could contain water at or slightly above the altitude of the bottom of the pits.

b. Water Quality

The north pit of the proposed Blackfoot Bridge mine stops only a short distance from the Blackfoot River; the ore outcrop extends to the river. On the basis of chemical analyses of Blackfoot River water from a site about 1 mile upstream from the proposed mine, the water is considered good and is a calcium bicarbonate type. The samples collected during high and low flow during 1972 and 1973 have comparable dissolved-solids compositions, as estimated from specific-conductance measurements (310 to 402 micromhos at 25° C, for discharges that range from 478 to 64 cfs). Further analyses of water from the Blackfoot River are included in the discussion of the Henry North site (Part 9.1).

4. AIR RESOURCES

The air quality near the proposed mine is good. Dust and emissions result from road traffic.

5. VEGETATION

At the Blackfoot Bridge site, 334 acres of the 600-acre Federal leaseholds are covered by conifer-aspen, including scattered timber-size conifers; 265 acres by sagebrush-grass; and about 25 acres by riparian vegetation, near the boundary between sections 23 and 26. Forage production is 400 to 1,800 pounds per acre, air dry weight.

No rare or endangered plant species are known to exist on the leasehold.

6. WILDLIFE

Big game inhabiting the Blackfoot Bridge area in significant numbers are deer, elk, and moose. Between 50 and 75 deer winter here. A north-south migration route is used by deer that summer north of Woodall Spring and winter in the area known as The Cedars. An east-west route is used by deer migrating downslope from the Aspen Range to winter west of here.

Ten to 20 elk inhabit the area. Their summer range is at the higher elevations of the Aspen Range. Moose are occasional visitors; a few moose, in fact, forage on riparian vegetation around the scattered springs during all seasons. Other big-game species, such as cougar and black bear, may inhabit the area infrequently.

The population of sage grouse is small, limited by the extent and quality of habitat. Excellent year-round forest grouse habitat is present, and the area supports good populations of both blue and ruffed grouse. Blue grouse are fairly common throughout the area and migrate seasonally between a winter range in the conifers and a summer or breeding range in the lower shrub grass slopes.

Because of its proximity to farmland, the area supports a large population of mourning doves and cottontail rabbits.

A large variety of waterfowl live in the extensive marshland immediately adjacent to the site. Approximately 1,000 Canada geese use the marshland for nesting and feeding and for an escape area. The Blackfoot River, immediately north, is also used by geese year-round. The Woodall Marsh and adjacent Blackfoot River accommodate from 2,500 to 3,000 ducks. Mallards and pintails constitute more than half the population, with canvasback, redheads, teal, and American baldpate being prominent. Whistling and trumpeter swans inhabit the Woodall Marsh adjacent to the leasehold. There is a potential for trumpeter swan nesting in the area.

A breeding population of greater sandhill cranes resides in the area; the habitat is suitable for whooping crane. Nests are built in the wet meadow marshlands, upland meadows, and some in the sagebrush-grass cover adjacent to springs. Marshland and riparian vegetation also attract a large variety of birds, including herons, egrets, gulls, terns, ibis, curlews, grebes, coots, willets, avocets, and cormorants. Most of the shore birds are breeders and summer residents, departing for warmer climates during the winter.

Because of the variety of prey species, most of the birds of prey can be found in the leasehold. The area is suitable for peregrine falcon hunting area.

A significant number of furbearers inhabit Woodall Marsh. The most abundant species is the muskrat. A few beaver are known in the Blackfoot River. Mink are fairly common along the marshland and riparian cover. Weasels, fox, coyote, and bobcat are also fairly abundant.

Song and insectivorous birds are numerous; most species are migratory. All species of amphibians and reptiles native to the region are present.

The peregrine falcon is known in the general area; one nest believed to be active is within 4 miles of the leasehold.

7. FISHERIES

The minesite is drained mainly by ephemeral streams, and no onsite stream supports a fishery. Surface waters during snowmelt and storms could reach the Blackfoot River. The Blackfoot contains more fish species and more fishing pressure than any other stream in the region, and includes cutthroat trout, rainbow trout, brown trout, sucker, dace, redside shiner, carp, and sculpin.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

The nearest farming is about one-quarter mile north of the northernmost pit. The haul road between the leasehold and Ballard mine bisects the farm west to east. The land extending 2½ miles north of the haul road is dry farmland, with numerous scattered lava outcrops. Meadows border the dry farmland on the north and west.

Between May 16 and September 30, 400 cattle are permitted on 120 acres of national-resource lands, in conjunction with privately owned land. Annual harvest is 22 AUM's, valued in 1974 at $130. Eighty acres of State land annually provide 26 AUM's of forage, valued at $153.

2. SOCIOECONOMIC DEVELOPMENT

The minesite is primarily near farmland and rangeland.

3. TRANSPORTATION AND UTILITIES SYSTEMS

Approximately 2,000 feet of the Monsanto haul road, the EPCO railroad spur, and the 46 KV Utah Power line are on the Blackfoot Bridge leasehold. These utilities cross near the north-south midpoint of the area in a common northeast-southwest corridor. Mining operations will not disturb these utilities.

4. RECREATION RESOURCES

The Blackfoot Bridge mine area provides deer, duck, and geese hunting, some ORV use, and driving for pleasure along Highway 34 and Blackfoot River Road. Fishing and camping along the Blackfoot River are excellent.

Access into the general area is good by State Highway 34. Because of roads, the river, and the mine, the area is not very remote, but it has some primitive characteristics. The proposed mine area is a steep ridge crest with rugged terrain.

No recreation facilities have been developed, so recreation uses have conformed to the utility roads and more moderate terrain. The number of visitors to the proposed site is moderate to low, hunters being the most common. Recreation visitors normally stay only a few hours.

ORV use and hunting have a good development potential. Trails are few because of the rugged terrain.

5. ARCHEOLOGIC AND HISTORIC VALUES

It is not known whether any archeologic or historic sites exist on the leaseholds. No surveys have been made.

6. AESTHETICS

The variety class for the Blackfoot Bridge area is rated low. The area is in the middleground viewing zone of State Highway 34, the Blackfoot River Road, and the Blackfoot River park, where many users are keenly interested in aesthetic quality. Public access within the area is by low-standard utility routes. Aesthetic experiences are similar to those in the valley bottoms, close to communities, and easily accessible throughout the region, in which the presence of human development is obvious but co-dominates with the natural landscape. Discordant elements are not numerous, but mining and livestock grazing have reduced the primitive, natural qualities.

CHAPTER III
ENVIRONMENTAL IMPACTS

The impacts described in this chapter are based upon the mining plan as originally submitted. Based upon a more probable level of production, as shown in table 1-1a, these impacts will not occur until well after the year 2000 A.D.

A. NATURAL ENVIRONMENT

1. LAND RESOURCES

a. Land Surface

Mining will create 135 acres of pits and 395 acres of dumps, and surface facilities will modify 120 acres. Two open pits will be 10,600 feet long, 500 feet wide, and about 200 feet deep. The volume of waste rock will be about 25 million cubic yards. Parts of the dumps will be on private land adjoining the leasehold.

b. Geology and Mineral Resources

Mining will remove 6 million short tons of phosphate rock containing 4,800 short tons of vanadium, 140,000 short tons of fluorine, 660 short tons of uranium, and 6,000 short tons of rare earths. Both phosphate and vanadium will be extracted.

c. Soils

Mining will disturb soils on 650 acres, at a rate of 320 acres per year for the first 2 years and 50 acres in the third year.

2. WATER RESOURCES

a. Water Supply

1. Surface Water

At the Blackfoot Bridge site, increased surface runoff and sediment movement may reach the marshland and the Blackfoot River. Overland flows from the large south dump and the northwest dump could flow into the marshland to the west, and overland flows from the northeast dump could flow northward into the spring area and the Blackfoot River. Dewatering of the pits will probably alter flow characteristics of adjacent tributaries. The impact will depend on where and how much the pumps discharge.

2. Ground Water

The impact of the Blackfoot Bridge mine on ground water will probably be minimal. Some small perched water bodies may be drained. Considerable ground water seepage into the pit may occur at altitudes below that of the Blackfoot River.

b. Water Quality

Sediment eroded from the Blackfoot Bridge mine may reach the Blackfoot River and the marshlands. Possible nutrient enrichment may be slight.

3. AIR RESOURCES

The proposed mine will not change regional air quality inasmuch as it will be a continuation of mining at Caldwell Canyon. Small amounts of dust and emissions will continue to result from the operations.

4. VEGETATION

Mining will progressively remove vegetation on 650 acres, of which approximately 285 acres are conifer-aspen, 210 acres sagebrush-grass, and 40 acres marshland; the access road will traverse mostly conifer-aspen.

5. WILDLIFE

Mining at Blackfoot Bridge will impact approximately 50 to 75 deer, 10 to 20 elk, up to 5 moose, 10 to 20 sage grouse, 50 to 75 forest grouse, and as many as 1,000 Canada geese and 2,500 ducks. In addition to these known populations, unknown populations of shorebirds, waterfowl, small mammals, raptors, reptiles, amphibians, furbearers and predators will be affected.

Year-round habitat for approximately 50 deer will be destroyed, causing their loss. A migration route will be blocked. Ten to 20 elk will be lost. Changes in sagebrush-grass habitat will reduce sage grouse summer range and blue grouse nesting habitat. Sage grouse, blue grouse and ruffed grouse brood-rearing habitat will be altered. Removal of mature conifer pockets will eliminate ruffed and blue grouse winter habitat. About 10 to 20 sage grouse, 50 to 75 forest grouse, and similar numbers of blue and ruffed grouse will be lost. The alteration of the marshland habitat will have an adverse effect on all waterfowl. including greater sandhill cranes and trumpeter swans.

Reduction of prey species will reduce predator populations, and affect raptors, including peregrine and prairie falcons that probably hunt the area. Other species of small birds, mammals, reptiles, and amphibians will be reduced.

6. FISHERIES

The Blackfoot Bridge mine will have no direct effects on fisheries unless runoff reaches the Blackfoot River. Such impacts would be low.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Forage from 650 acres of rangeland with an estimated average annual production of about 400 pounds of usable forage per acre, air dry weight. During the life of the mine, about 260 AUM's, valued at $1,530 annually, will be lost on at least part of the site; some additional forage may be lost on adjacent lands.

2. SOCIOECONOMIC DEVELOPMENT

Because they will be developed sequentially and not overlap one another, the Trail Creek, Caldwell Canyon, and Blackfoot Bridge mines will employ a fairly stable work force of about 200. The social and economic impacts to the sites will be minimal and by themselves are not significant, but the cumulative effects of these and other mining proposals will signifiantly impact the regional socioeconomics as described in Part 1.

3. TRANSPORTATION AND UTILITIES SYSTEMS

Impacts will be similar to those discussed in Part 1, chapter III.

4. RECREATION RESOURCES

The proposed Blackfoot Bridge mine will diminish deer and waterfowl hunting, presently a major recreation use, and may affect fishing in the Blackfoot River to a limited degree.

5. ARCHEOLOGIC AND HISTORIC VALUES

It is not known at this time whether any archeologic or historic sites will be impacted. No surveys have been made.

6. AESTHETICS

The Blackfoot Bridge site is in the middleground viewing zone of Idaho Highway 34 and the Blackfoot River road; it will add to the aesthetic impacts of current mining.

CHAPTER IV
MITIGATING MEASURES

This chapter discusses mitigating measures that apply specifically to the Blackfoot Bridge proposal. Measures that apply generally to the Henry North Continuation, Trail Creek, Caldwell Canyon, and Blackfoot Bridge are discussed in Part 9.1, Chapter IV. These shall be required at this site.

The following stipulations should be imposed as additional mitigating measures.

The proposed mine dump in Woodall Marsh should be relocated. No rights-of-way for roads or railroads should be permitted unless absolutely necessary within one-fourth mile of Woodall Marsh. Catchment basin constructed in drainages below the mine should have adequate capacity to protect the Balckfoot River fishery. Roads, conveyors, or other mining development should not be close to the Blackfoot River or adjacent marshes.

CHAPTER V
ADVERSE EFFECTS THAT CANNOT BE AVOIDED

At either level of mining, changes in the land surface are unavoidable (fig. 9-17); neither of the proposed pits will be backfilled. The proposed mining will thus create 135 acres of pits and 395 acres of dumps. Soils will be disturbed on 650 acres. An amount of sediment will be contributed to the Blackfoot River from the Blackfoot Bridge site.

The stability of the large dumps may not be ensured by revegetation and other surficial treatment. At the Blackfoot Bridge site, the marsh and some of the slopes may not have enough foundation strength to support the dumps.

Mining will ultimately remove vegetation from 650 acres, with a maximum of about 500 acres cleared at any one time during the life of the mine. Annual forage production on 728 acres of reclaimed land will probably not exceed 200 to 900 pounds per acre, air dry weight--about half the present value. Production on 135 acres of unreclaimed pits will be lost.

Mining on the Blackfoot Bridge site will progressively remove forage on at least 650 acres of winter range for mule deer and elk; and 50 to 75 mule deer, 10 to 20 elk, and 1 to 5 moose will be lost. A major deer migration route will be blocked.

The habitat of 10 to 20 sage grouse and 50 to 75 forest grouse will be destroyed. As many as 1,000 geese and 2,500 to 3,000 ducks will be adversely impacted. An area suitable as additional whooping crane habitat will probably be altered, as will a possible nesting area and an area currently utilized by trumpeter swans. Nesting and utilization by sandhill cranes will decrease noticeably.

Suitable hunting area for the peregrine falcon will be altered.

Forage will ultimately be removed from 650 acres of rangeland. Average annual production of usable forage on about 515 acres of reclaimed land will probably not exceed 200 pounds per acre, air dry weight; forage on 135 unreclaimed acres will be almost totally lost.

Impacts on archeologic and historic values cannot be assessed until a survey, as required under Executive Order 11593, is completed.

Impacts on fisheries will be negligible unless sediment reaches the Blackfoot River, in which event impacts will be low.

The mine will contribute to the aesthetic impact of adjacent ongoing mining.

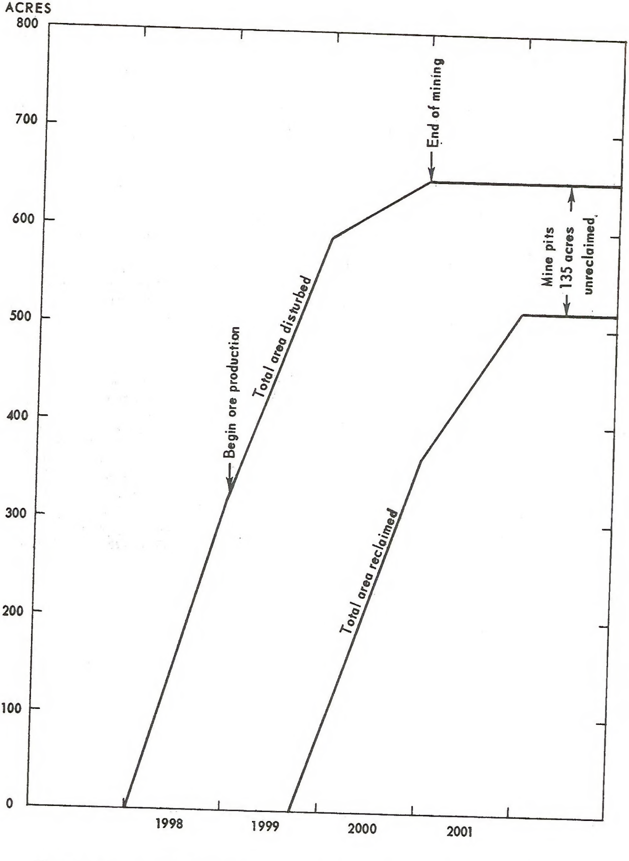


Figure 9-17.--Land disturbance and reclamation, Blackfoot Bridge site.

CHAPTER VI
SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

At either level of mining, 6 million short tons of phosphate rock will be removed from the site for processing into elemental phosphorus. Soils will be disturbed on 650 acres, and 25 million cubic yards of overburden and bedrock will be moved.

During mining, vegetation will be progressively removed from 650 acres; forage production of 400 to 1,800 pounds per acre, air dry weight, will be lost on about 300 to 500 acres at any given time. As many as 75 deer, 20 elk, and 5 moose will be displaced to adjacent ranges already at or near carrying capacity. A significant number of waterfowl will also be displaced. On the minesite, about 260 AUM's of forage, valued at $1,530 annually, will be lost during mining, because at least part of the site will not be available for grazing. The aesthetic quality of the area and its outdoor recreation opportunities will be diminished during mining.

Annual forage production on 515 acres of reclaimed land will probably not exceed 200 to 900 pounds per acre, air dry weight--about half the present value. Production on 135 acres of unreclaimed pits will be lost. Some long-term reduction of game herds, especially deer and elk, will result from competition on nearby ranges from the displaced animals. Average annual production of usable forage on 515 reclaimed acres will probably not exceed 200 pounds per acres, air dry weight; production on 135 unreclaimed acres will be virtually zero. On the entire site, average production of usable forage of about 155 AUM's, valued at $925, will be lost annually. The landscape changes will have long-term effect upon the aesthetic character of the area by conflicting with the natural remoteness and contrasting with its visual character.

CHAPTER VII
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

At either level of mining, 6 million short tons of the estimated 1 billion tons of resources in southeastern Idaho will be mined and processed. This is irretrievable. This ore contains 0.14 million short ton of fluorine, 4,800 short tons of vanadium, 660 short tons of uranium, and 6,000 short tons of rare earths. The vanadium will be recovered. The attendant landscape changes in the form of dumps and pits is largely irreversible. Productivity will be almost totally lost on 135 acres and partially lost on 515 reclaimed acres. Loss of wildlife, to the extent that it cannot locate successfully on adjacent range, is also irretrievable. The remote, undeveloped character of the area will be irreversibly and irretrievably committed to the intrusion of mining-related changes.

In the process of removing 6 million tons of ore, the mining reclaimation will require about 3.0 million gallons of diesel fuel, 240,000 gallons of gasoline, and unquantified amounts of lubricants, explosives, electricity, and construction materials.

Transportation of the ore will require about 440,000 gallons of diesel fuel.

Processing of the ore into elemental phosphorus will require 6.2 billion kilowatt-hours of electricity, 24,000 gallons of gasoline, 720,000 tons of coke, 1.4 million tons of silica, 18,000 tons of carbon electrodes, and about 8,000 acre-feet of water.

Secondary recovery of vanadium by Kerr-McGee will require 42,000 tons of limestone, and 6,000 tons each of salt and soda ash, as well as an undetermined large amount of electricity.

CHAPTER VIII
ALTERNATIVES

This chapter discusses alternatives that apply specifically to the Blackfoot Bridge proposal. Alternatives that apply generally to the Henry North Continuation, Trail Creek, Caldwell Canyon, and Blackfoot Bridge proposals are discussed in part 9.1, chapter VIII.

From the Blackfoot Bridge site, Monsanto proposes to haul ore 8 miles by private road to its plant. Both the haul road and the railroad now bisect the lease area. Impacts of the alternatives would be practically the same.

PART 10

J.R. SIMPLOT COMPANY

PART 10.1
NORTH TRAIL CANYON MINING PLAN

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PART 10
J. R. SIMPLOT CO.

The J. R. Simplot Company entered the phosphate industry in 1945 with exploration for and development of phosphate ore on the Fort Hall Indian Reservation, about 17 miles east of Fort Hall. The Gay mine opened on the reservation in 1946. An agreement between Simplot and the Westvaco Chemical Co. (FMC Corp.) enabled Simplot to supply furnace-grade rock to FMC for elemental-phosphorus production, while retaining the acid-grade rock for fertilizer production. Both plants are west of Pocatello.

In 1959, Simplot acquired the Anaconda Company's phosphate interests at Conda. The underground mine, which had operated intermittently since 1919, was converted to open-pit operation. The beneficiation plant was modified to accommodate the lower grade ore obtained by open-pit mining. All phosphate-ore concentrates produced at Conda are now shipped to the Simplot fertilizer plant at Pocatello.

To date, all Simplot mining in the Soda Springs area has been from patented land, but dumps have been placed on BLM lands. The company now proposes two new mines, North Trail Canyon and Middle Sulphur Canyon, each of which lies partly on Federal land but primarily on patented land. Federal lands are in the Caribou National Forest and on BLM lands.

This part considers only the impacts on and near the respective Federal leaseholds that would be generated by the proposed mining. It concentrates on aspects of the present environment or impacts that are specific for each mining operation or are especially significant; conditions or impacts common to all sites are discussed in Part 1 and are not repeated here. The total impact of each proposed mining plan consists of the common impacts discussed in Part 1 plus those discussed in this Part.

PART 10.1
NORTH TRAIL CANYON MINING PLAN

CHAPTER I
DESCRIPTION OF PROPOSED ACTION

The proposed minesite is in Trail Canyon, about 6 miles northeast of Soda Springs (fig. 10-1). The proposed North Trail Canyon mine involves Lot 7 of Federal phosphate lease I-04494, privately owned fee land, and BLM-administered permit land, I-4298. Lease I-04494 has 467.48 acres, of which Lot 7 comprises 20 acres. Although Federal action is limited to the 20 acres on Lot 7 and 121 acres on the BLM permit land, mining on this land is an integral and necessary part of the proposed mining operations.

Over 197,000 tons of phosphate rock have been mined from I-04494 since 1973, but no production has ever come from Lot 7 itself. Over the past 2 to 3 years, a small amount of phosphate rock has been produced from a pit on adjacent patented land.

Phosphate reserves in the present proposal constitute a relatively small part of Simplot's reserves in the nearby area. Production from their Conda mine, 2 miles to the northwest, is sized and washed at Conda and shipped by rail to their fertilizer plant at Pocatello.

The North Trail Canyon mine plan is adequate for approval provided the activities conducted on BLM special land use permit I-4298 are regulated by suitable stipulation and monitored by BLM. The permit application and approved BLM permit with stipulations should be an exhibit in the mine plan.

The following is taken entirely from the plan prepared and submitted by the J. R. Simplot Company to the Conservation Division, U.S. Geological Survey, Pocatello, Idaho on December 31, 1974, and from interviews with company representatives. The company refers to the plan as a partial plan.

A. PROPOSED MINING OPERATIONS

The plan proposes mining on the west limb of the Trail Creek syncline, by conventional open-pit methods (fig. 10-2). The ore occurs chiefly in a hanging wall bed overlain by Rex Chert and a footwall bed underlain by Wells carbonate rock. Low-grade phosphate waste shales separate the mineralized beds. The deposit strikes N. 15°-20° W. and dips eastward about 55°.

Approximately 900,000 tons of ore will be mined over a 3-year period beginning in 1976, at a stripping ratio of 3.8:1. About 4.2 million cubic yards of waste will be placed in three disposal areas. Two waste sites, designed to accommodate 1.23 million yards, are on fee-owned land, and one waste site is on adjacent BLM special-use permit land. Approximately 30,300 tons of the ore is within the Federal phosphate lease. The 3.8:1 stripping ratio will exploit ore to a pit-floor altitude of 7,200 feet, or a depth of about 350 feet. The company

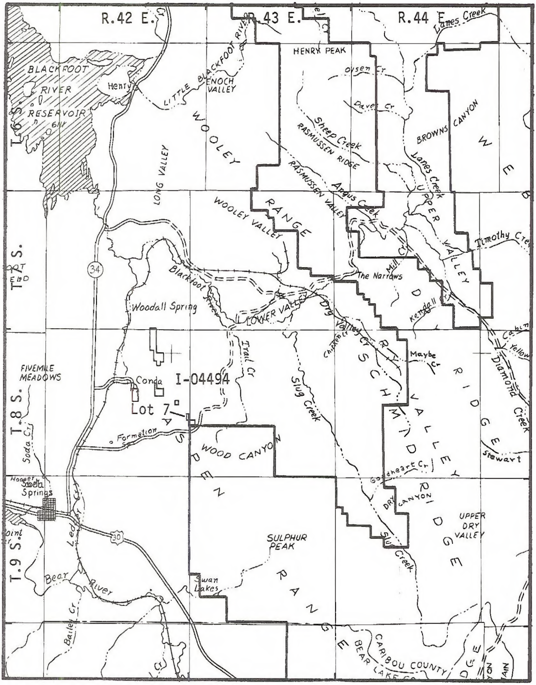

Figure 10-1.--Location of Federal phosphate lease for the proposed North Trail Canyon mine.

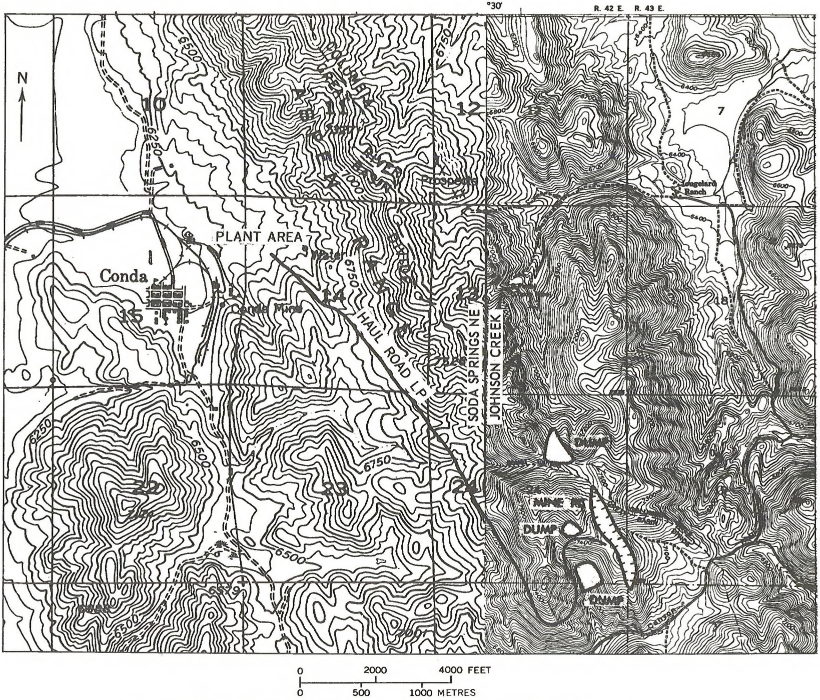

Figure 10-2.--Mining plan proposed for the North Trail Canyon site.

]

does not plan to backfill the pit until all altered ore has been mined. The total pit area is 17.1 acres, of which 1.8 acres are on Federal land.

The west limit of the pit will be the outcrop of the footwall ore. The overall blackslope will follow the ore along the dip. Where required by slope, benches will be cut at 40-foot intervals to give an overall 47° backslope.

Most of the ore will be extracted between May and October. Overburden will be removed mainly during the winter. Waste shales between the ore zones will be removed with the ore. Topsoil will be stockpiled in the use-permit overburden area; vegetation will be cleared, windrowed, and control-burned. Waste dumps will cover 35 acres and other facilities another 35 acres.

The chert overburden will be drilled and blasted as required, excavated by 4½-yard shovels, and trucked to waste piles. The waste shale will be stripped and moved to dump areas by twin- and single-engine scrapers. The ore will be mined by 2½-yard shovels that work at a previously prepared 15-foot bench. The ore will be loaded into 20- to 35-ton trucks and hauled by private road to stockpiles at the Conda beneficiation plant. Two stockpile systems are maintained; one + 30 percent P_2O_5, and the other + 24 percent P_2O_5. To meet these grades, selective mining is required.

The company does not propose stockpiling of marginal-grade phosphate ore.

The mining plan proposes mining nearly 1 million tons of phosphate rock during a 3-year period, beginning in 1977. Mining will begin at the north end of the outcrop on the high point of the ridge and progress southward. Fifteen-foot-high ore benches will be mined the length of the nearly 3,000-foot-long pit. The pit floor will be sloped to the southern daylight end to provide water drainage.

B. RECLAMATION

Two waste dumps, north and west of the pit, will be constructed on company fee-owned land. A waste dump and downcanyon retention dam and catchment basin will be constructed on the BLM use-permit land. (BLM has provided these stipulations to the use permit: protect a grove of aspen trees near the waste dump; build the dump on a 2½ to 1 slope, with benched slopes designed to remove water; seed, by drill, a mixture prescribed by the District Manager; and rehabilitate all roads, when their utility ends.)

The company proposes to contour the dumps to blend with the topography, mantle the surface with stockpiled topsoil, and revegetate when slope creep has stabilized. Water will be channeled away from dumps and haul-roads and dissipated into brush draws. Catchment basin and dam will be constructed as designed in the plan.

C. SURFACE FACILITIES

No buildings or other surface facilities are planned.

The mine plan calls for hauling the ore from the mine to the beneficiation plant by truck over a private road. Simplot Company is currently planning a slurry pipeline to convey the ore from their operations on Woodall Mountain to the plant. Should this trial prove successful, a slurry pipeline system may be used for the North Trail Canyon mine rather than trucking.

CHAPTER II
DESCRIPTION OF THE EXISTING ENVIRONMENT

A. NATURAL ENVIRONMENT

1. CLIMATE

The climate of the region is generally described in Part 1. Temperatures at the minesite average 3 to 5 degrees below those at Conda, and the growing season is shorter. At North Trail Canyon, precipitation on the ridge is about 20 inches annually. Data from the Idaho Bureau of Mines and Geology for nearby Dry Valley (Ralston and Trihey, 1975) indicate that eastern slopes favor the accumulation of snowdrifts. Since the lease area is on the eastern slope of the Aspen Range, snow accumulations from drifting are likely.

2. LAND RESOURCES

a. Land Surface

The proposed mine is in the Aspen Range and extends 0.8 mile from Trail Canyon northwestward up and along a ridge. The highest part of the site is at 7,565 feet. Relief within the mine area is about 350 feet.

b. Geology and Mineral Resources

The outcrop of the Meade Peak Member strikes N. 15^o-20^o W. and dips about 55^o E. It is truncated at the north end of the site by the Shields Canyon fault. Other transverse faults displace the Meade Peak slightly to moderately, and a longitudinal fault near the north end of the area locally cuts out the lower phosphate zone. The southern part of the site seems significantly less disturbed than the northern.

The Meade Peak is between 160 and 200 feet thick, and the lower and upper ore zones total about 24 feet. About 30,000 tons of phosphate rock of a total of 1 million tons mined will come from the Federal leasehold. Estimates of the total resources of some significant elements in the 1 million tons of phosphate ore are: 240,000 short tons of fluorine, 110 short tons of uranium, 800 short tons of vanadium, and 1,000 short tons of rare earths.

c. Soils

Landtype association 4 covers the entire leasehold. It is described in Part 1, Chapter II; Table 10-1 gives soil characteristics.

3. WATER RESOURCES

a. Water supply

1. Surface Water

One proposed dump will straddle upper Shields Canyon, which drains about 40 acres. Another straddles a tributary of Trail Creek, Table 10-1.--Physical characteristics of soils at North Trail Canyon minesite. VL = very low, L = low, M = moderate, H = high, VH = very high

Landtype Assn.	Soil families	Erosion in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road construction hazards	Slope range, in percent	Revegetation potential
			Depth, in inches	Suitability					
4	Pachic Cryoborolls, loamy-skeletal, mixed	.001	12	H	4.3	VL	L	1-10	VH
	Argic Pachic Cryoborolls, fine, mortmorillonitic	.015	12	M	9.0	M	M	25-45	M
	Cryic Pachic Paleoborolls, fine, mortmorillonitic	.015	12	M	9.0	M	M	20-40	M
	Argic Cryoborolls, fine, montmorillonitic	.015	8	L	8.0	M	M	25-45	M

which drains about 95 acres. Neither dump is on the Federal leasehold. The channels above the dumps are ephemeral, but they may carry considerable amounts of water during snowmelt.

2. Ground Water

Strata at the North Trail Canyon site contain only small perched bodies of water, probably mostly in the Rex Chert. Drill-hole data indicate that none of the formations to be worked are water-saturated. The direction of ground-water movement is unknown.

b. Water Quality

No chemical quality data are available for Trail Creek, but the water is probably similar to that in the Blackfoot River. Data for several analyses of water from the Blackfoot River are given in Part 1. Another sample collected at the same site on December 12, 1974, about 4 miles downstream from the confluence of Trail Creek, showed the water to be a predominantly calcium bicarbonate type, with calcium making up 66 percent of the cations and bicarbonate 80 percent of the anions.

Nitrate plus nitrite was 1.4 ppm, as NO_3, and orthophosphate was 1.4 ppm, as PO_4. In a sample collected March 25, 1975, the same constituents were 0.4 and 0.03 ppm, respectively. The lower values reflect early snowmelt prior to erosion by later major snowmelt. For ground-water data, one analysis for a spring (8S-42E-36a1S), about 1 mile south of the proposed pit, is available. The water is predominantly a magnesium calcium bicarbonate type, with magnesium and calcium making up 64 and 31 percent of the cations, respectively. Although this water may not represent all ground water in the area, its composition is similar to Soda Springs and Hooper Springs.

4. AIR RESOURCES

The present air quality near the proposed minesite is good. Minor amounts of dust and particulates do occur along roads. Dust and particulates from the nearby Conda mine do not reach the area in noticeable amounts.

5. VEGETATION

The vegetation on the Federal leasehold at the North Trail Canyon site is almost entirely sagebrush-grass. Forage production ranges from 400 to 1,800 pounds per acre, air dry weight.

6. WILDLIFE

No elk-calving grounds, winter range, or other critical areas are known in the North Trail Canyon area. Elk and deer migrate through the area in early winter and early spring. During winters of heavy snowfall and extreme cold, more than 40 elk have been counted on Rabbit Mountain. An occasional moose has been sighted in the area, and black bear, mountain lion, and other big game may inhabit the area occasionally, but densities and frequencies of use are unknown.

Sage grouse are not known to inhabit the area, but blue and ruffed grouse occupy the area during late summer, fall, and winter. Mourning doves are also present. No raptor nesting sites have been found. The area, however, is hunted by raptors, particularly golden eagles, red-tail hawks, and an occasional peregrine or prairie falcon.

The habitat is favorable for fox, bobcat, weasel, coyote, and spotted and striped skunks. Fisher, pine martin, and Canada lynx could be present, but recent documentation is lacking. Over 60 species of song and insectivorous birds inhabit the area, many only during migrations. Most amphibians and reptiles common to the region are present.

No threatened or endangered species have been observed on the minesite.

7. FISHERIES

The proposed minesite has mainly ephemeral drainages that do not support fish populations.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Agriculture near the North Trail Canyon lease is primarily dryland small-grain crops about 1.5 miles to the west, at the base of Aspen Range. The farming tract is bisected by the haul-road from the Conda mine. The west edge of the tract is bordered by Simplot's Conda plant and railroad, and by Monsanto's haul-road.

Between May and September 30, 3,500 sheep are permitted to use 400 acres of National Resource Lands on and adjacent to the minesite in conjuction with 40 acres of State land and adjoining private land.

2. SOCIOECONOMIC DEVELOPMENT

The proposed mine is an extension of Simplot's ongoing mining, which employs about 80 people.

3. TRANSPORTATION AND UTILITIES SYSTEMS

With the exception of primitive drilling access roads, no transportation or utilities systems are located within the North Trail Canyon leasehold. A road adjoining the proposed operation and currently used for access to drilling operations will be used as the primary haul route from the minesite to the Conda beneficiation plant.

Trail Canyon road runs about 1.5 miles south of the site. It is kept open in winter to the pass (just above a ski area) and is closed east of the pass.

4. RECREATION RESOURCES

The primary recreational use of the area is deer and grouse hunting. Motorcycling and snowmobiling are gaining in popularity, as the terrain is excellent. A small private ski resort, with one rope tow, is located south of the leasehold. Formation Cave, about 4 miles southeast of the mining area, provides excellent spelunking. The number of visitors is moderate to low, hunters being the most common. Recreational visits normally last less than 2 hours. There are several summer homes along Trail Canyon Road. Recreation is possible at the proposed site year-round, but fall usually attracts most use.

Although access into the specific areas to be mined is poor, the remote qualities have been generally destroyed, since parts of the area are already being mined.

5. ARCHEOLOGIC AND HISTORIC VALUES

Subsequent to the Draft statement, Blaine Miller, an archeologist with the Forest Service, made a cultural inventory of the leasehold. No artifacts were recovered, nor was there any evidence of prehistoric cultures. No historic sites are recognized on the leasehold. An archeologic clearance was recommended by Richard L. Harris, Director, Recreation, Lands and Minerals, U. S. Forest Service.

6. AESTHETICS

The variety class for the area is rated low. The North Trail Canyon proposed site is in the foreground and middleground viewing zone of the Trail Canyon road, which is a secondary route.

CHAPTER III
ENVIRONMENTAL IMPACTS

Since 1973, the J. R. Simplot Company has mined over 197,000 tons of phosphate rock from Federal Lease I-04494. This mining plan covers only Lot 7, which is 20 acres. It is only this part of the entire operation in the Conda area for which Federal approval to mine is required. Less than 2 acres of the Federal leasehold will be disturbed by the proposed mining. These impacts are negligible when compared with past and projected impacts in the area. Impacts, however, of the full mining proposal are discussed here, and have been included in the regional appraisal, Part 1.

A. NATURAL ENVIRONMENT

1. LAND RESOURCES

a. Land Surface

Mining will create 17 acres of pit and 35 acres of dumps. Surface facilities will modify 35 acres. Less than 2 acres of the pit, 14 acres of dumps, and no surface facilities will be on the Federal leasehold.

The entire pit will be 3,800 feet long, 300 to 500 feet wide, and about 350 feet deep. Waste rock will total 5 million cubic yards (about 175,000 cubic yards will come from the leasehold). Waste dumps will be smoothed and will have a low profile.

b. Geology and Mineral Resources

Mining will remove about 1 million short tons of phosphate ore, of which 30,000 short tons will come from the Federal leasehold. The total ore will contain 24,000 short tons of fluorine, 110 short tons of uranium, 800 short tons of vanadium, and 1,000 short tons of rare earths.

c. Soils

Mining will disturb soils on 87 acres (about 2 acres on the Federal leasehold), at the rate of about 20 acres per year.

2. WATER RESOURCES

a. Water Supply

1. Surface Water

At the North Trail Canyon site but off the Federal leasehold, a small storage pond holding a few acre-feet of water may not effectively control sediment movement; snowmelt from drifts above and on the dumps could fill the pond with sediment in very short time. Buffer zones in Shield Canyon and the tributary of Trail Creek may not control movement of sediment before it reaches perennial streams.

2. Ground Water

The site is on a ridge and steep slope, which are probably drained of ground water. The proposed pit could, however, intersect and drain one or more small bodies of perched water that now sustain vegetation.

b. Water Quality

The impacts on water quality will be similar to those discussed in Part 1. Impacts at this site will be negligible.

3. AIR RESOURCES

Impacts from mining on the Federal leasehold will be negligible compared with impacts of mining on adjacent patented land.

4. VEGETATION

Mining will progressively remove vegetation on 87 acres; about 2 acres--all sagebrush-grass--are on the Federal leasehold.

5. WILDLIFE

Mining on the Federal leasehold will directly affect wildlife on only 2 acres. The mining on adjoining patented land will directly affect wildlife on about 85 more acres. Loss of winter range will cause the loss of 60 deer by displacing them to adjacent ranges now at or near carrying capacity. Limited data suggest that both winter and summer range for elk will be modified, and their migration routes will be blocked. As many as 25 elk may be lost. Moose will move to other ranges. Black bear and mountain lion will probably cease using the area.

Impacts on grouse are unknown. Hunting habitat for many raptors will be reduced. Furbearers, including badger, coyote, skunk, and weasel, will decline, as will other birds, mammals, amphibians, and reptiles.

6. FISHERIES

Because the mining area is not near perennial water bodies, there will be no direct effects on fisheries if adequate control measures are employed.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Impacts on the 17 acres of disturbed land on the Federal leasehold will be insignificant. Mining will progressively remove forage from a total of 87 acres of land with an estimated 400 to 600 pounds of usable forage per acre. During the life of the mine, about

175 sheep months of forage, valued at $275 annually, will probably be lost on most of the total minesite; some additional forage may be lost on adjacent lands.

2. SOCIOECONOMIC DEVELOPMENT

The proposed North Trail Canyon mine will employ about 80 people when fully operational. The socioeconomic impacts on the site are minimal and by themselves are not significant, but they contribute to the regional socioeconomic impacts described in Part 1.

3. TRANSPORTATION AND UTILITIES SYSTEMS

Impacts will be similar to the general impacts discussed in Part 1.

4. RECREATION RESOURCES

The proposed mining in North Trail Canyon will further impact recreation resources already impacted by the nearby Conda mine. Additional reduction of wildlife habitat and increased human activity will further diminish big-game and bird hunting. Further alteration of the landscape and an increase in noise will diminish the quality of hunting and ORV use and of summer living and travel along Trail Creek road. The impacts from the Federal leasehold, however, will be negligible compared with those from mining on adjacent patented land.

5. ARCHEOLOGIC AND HISTORIC VALUES

No known sites will be impacted.

6. AESTHETICS

The site is in the middleground viewing zone of Idaho Highway 34. Mines, a phosphate plant, an ore-haul road, and other visual disturbances now exist between the highway and the proposed sites. The site is in the foreground and middleground viewing zones of the Trail Canyon road, but much of the proposed disturbance will be concealed by hills and vegetation.

CHAPTER IV
MITIGATING MEASURES

This chapter discusses mitigating measures that apply to both the North Trail Canyon and Middle Sulphur Canyon proposals; in addition, it discusses a measure that applies specifically to North Trail Canyon.

State and Federal laws, regulations, and administrative policies that require mitigation or reclamation of mining impacts, and requirements of the surface-management agencies and the USGS District Mining Supervisor are discussed in detail in Part 1, Chapter IV. These shall be required at these sites. Other possible mitigating measures as discussed in Part 1, Chapter IV, shall also be required as appropriate.

The following proposals for mitigating impacts are taken directly from Simplot's mining plans for the two minesites. However, the only part of the North Trail Canyon mine that is on the Federal leasehold is about 2 acres of pit and about 15 acres of dumps and roads.

The dumps at both sites will be graded and shaped to blend with the natural topography. They will be designed to specifications that provide the most stable configuration, considering the topography, drainage, compaction, and relief. Siltation from slope wash from active mining areas will be controlled by check dams and catch basins. Slopes of the waste dumps will be benched to channel runoff from each bench into sediment basins. Water from these basins will be used to control fugitive dust from service areas and haul roads. The catchment basins will also be used as a source of water for livestock, and its quality will be monitored. The south faces of the dumps are amenable to final shaping into a continuous long slope. The company, however, does not recommend this reshaping for the east-facing slopes because of heavy spring runoff. Diversion ditches will be constructed in limestone, to minimize erosion. Reclamation, including revegetation, will begin on benches the first year and on slopes the second year after slopes have stabilized. Dumps will be revegetated, using topsoil where possible. Access roads will be as close to existing grade as possible. All transportation and utility systems will be removed and the disturbed areas rehabilitated.

Simplot has proposed the following specific measure for the North Trail Canyon site--that the pit may be backfilled.

Additional hydrologic data should be obtained to determine if the proposed small catchment basin and other water control structures are adequate.

CHAPTER V
ADVERSE EFFECTS THAT CANNOT BE AVOIDED

Changes in the land surface configuration are unavoidable (fig. 10-3); 51 acres will not be reclaimed, of which only 2 acres are on the Federal leasehold.

The North Trail Canyon operation will disturb soils on 87 acres, 2 acres of which are on the Federal leasehold.

During peak flows at the North Trail Canyon site, pond-retention time may be too short to decant suspended sediment effectively, and sediment may be spilled into Trail Creek. Impacts on Trail Creek may be moderate to severe, however, largely because of the impact of adjoining mines.

Additional dust and emissions during mining are unavoidable, but the contribution from the Federal leasehold will be very small.

During mining, vegetation will be removed from 17 acres on the Federal leasehold and from about 70 acres of adjacent patented land. About 60 acres will be cleared at any one time during most of the life of the mine. Annual forage production on 36 acres of reclaimed land on the adjoining patented land will probably not exceed 200 to 900 pounds per acre, air dry weight--about half the present value. Production on 51 acres of unreclaimed roads and pit will be lost; 2 acres of the pit will be on the leasehold.

Mining adjacent to the North Trail Canyon leasehold will alter 87 acres of deer range, as well as other wildlife habitat. Elk and deer migration routes will be blocked or adversely impacted, and about 60 deer and 25 elk will be lost. Overutilization of adjacent winter ranges could result from the displacement, further reducing the overall herd. Few, if any, moose will use the area, and black bear and mountain lion will abandon or rarely use it. Population of furbearers will decline significantly. Mourning-dove populations will diminish significantly, and a possible wintering area for blue grouse will be altered. Reduction in numbers of small animals will reduce prey for predators.

There will be no unavoidable adverse impacts to fisheries with proper sediment control and rehabilitation methods.

Forage will ultimately be removed from 87 acres of rangeland, about 2 acres of which are on the Federal leasehold. Average annual production of usable forage on 36 acres of reclaimed land will probably not exceed 200 to 900 pounds per acre, air dry weight; forage on 51 unreclaimed acres will be almost totally lost.

There will be no significant adverse socioeconomic impacts at the site. The cumulative adverse effects that cannot be avoided on a regional scale are described in Part 1.

Unavoidable impacts on recreation resources will be low to moderate because of past and current disturbances in the area.

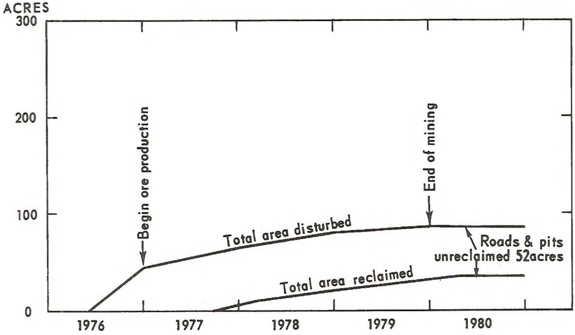

Figure 10-3.--Land disturbance and reclamation, North Trail Canyon site.

Mining on the Federal leasehold will add insignificantly to the visual deterioration of past and planned future mining operations in the immediate vicinity.

CHAPTER VI
SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

From about 1976 through 1979, about 30,000 tons of phosphate rock will be removed from the Federal leasehold for processing into fertilizer, along with 875,700 tons from adjacent patented lands. Mining will disturb soils on about 87 acres (about 17 acres on the Federal leasehold), and move about 5 million cubic yards of waste rock (about 175,000 cubic yards on the leasehold). Mining will extend the local short-term lowering of air quality caused by present and planned future mining nearby.

During mining, vegetation will be progressively removed from 87 acres, about 17 acres of which are on the Federal leasehold. Forage production of 400 to 1,800 pounds per acre, air dry weight, will be lost on about 60 acres at any given time. Wildlife populations will be disrupted. About 60 deer, 25 elk, and perhaps 5 moose will be displaced by the adjacent mining to nearby ranges at or near carrying capacity. On the entire minesite, about 175 sheep months of forage, valued at $275 annually, will be lost during mining, because most of the site will probably not be available for grazing; only 17 acres of the total 87 acres disturbed will be on the Federal leasehold. The aesthetics of the area and its recreation resources will be lowered during, and as a result of, the mining operation.

Similarly, impacts on the long-term productivity of the Federal leasehold will be insignificant in comparison with those on adjacent patented land. Annual forage production on 36 acres of reclaimed land will probably not exceed 200 to 900 pounds per acres, air dry weight--about half the present value. Production on 51 acres of unreclaimed roads and pit will be lost; 2 acres of the unreclaimed pit will be on the leasehold. Average annual production of usable forage on 36 reclaimed acres will probably not exceed 200 to 300 pounds per acre, air dry weight. Production on 51 unreclaimed acres will be virtually zero; the Federal leasehold will include 2 unreclaimed acres. On the entire site, average production of usable forage of about 136 sheep months, valued at $210, will be lost annually.

Impacts on archeologic sites cannot be assessed until surveys, as required under Executive Order 11593, are completed.

Mining on the Federal leasehold will add insignificantly to the visual deterioration of past and planned future mining operations in the immediate vicinity.

CHAPTER VII
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

About 1 million short tons of phosphate rock will be mined and processed from 1977 through 1979. This ore contains 24,000 short tons of fluorine, 110 short tons of uranium, 800 short tons of vanadium, and 1,000 short tons or rare earths, which will be removed but not recovered. Only about 3 percent of this commitment will come from Federal lands.

The mining and reclamation will require about 650,000 gallons of diesel fuel, and 40,000 gallons of gasoline.

Transportation of the ore to Conda will require about 120,000 gallons of diesel fuel.

Beneficiating the ore at Conda will require about 8 million kilowatt-hours of electricity, 4,000 gallons of gasoline, and about 40 acre-feet of water.

Transportation of the beneficiated rock to Pocatello will require about 190,000 gallons of diesel fuel.

Converting the beneficiated rock into fertilizer will require about 88 million kilowatt-hours of electricity, 3.2 billion cubic feet of natural gas, 4,000 gallons of gasoline, and 900,000 tons of sulfuric acid.

CHAPTER VIII
ALTERNATIVES

The general administrative options available to the Secretary of the Interior are discussed in Part 1. Rejection of the North Trail Canyon proposal would prevent Simplot from mining not only the 30,000 tons of ore on the Federal leasehold but also an unknown portion--perhaps as many as 200,000 tons--of the 875,000 tons that lie down dip on adjoining patented lands. Impacts would be transferred to the remaining parts of those lands.

The following are alternatives to the proposed mine plan.

Simplot proposes backfilling as an alternative. The alternative of replacing all the waste would eliminate the dumps on adjacent patented land and nearly fill the pit. This would lessen impacts on the land surface and on wildlife. Simplot proposes to truck ore via private road to Conda for beneficiation. The primary haul road would probably have less impact than the proposed alternative, in that it would skirt deer and elk winter range. The proposed alternative slurry lines would probably have less impact than either haul road.

PART 10.2
MIDDLE SULPHUR CANYON MINING PLAN

CHAPTER I
DESCRIPTION OF THE PROPOSED ACTION

The proposed project is located in Middle Sulphur Canyon approximately 7 miles east of Soda Springs (fig. 10-4). The plan involves two mining panels on Federal phosphate lease I-01603, which is entirely within the Caribou National Forest. The lease is 688.08 acres; the two panels cover 74.1 acres. Limited exploratory drilling has been done on Simplot's adjacent patented land. Although Federal action is limited to the 74 acres in the 2 panels, mining of these panels is a necessary and integral part of the total operation.

Since filing the mine plan, the company recieved approval from USGS to conduct exploration consisting of 88-drill holes and 5-trenches on the leasehold. The exploration will test phosphate mineralization in the hanging wall section and resolve geologic structure problems. Until this exploration is completed the mining plan as submitted is conceptual and does not contain sufficient engineering details for final consideration of approval or disapproval under 30 CFR 231. The following details are lacking at this time and will be required for final consideration.

1. Ore grade, quantities and structure, supported by cross sections through the mineralized zone, are necessary.

2. The haulroad from the mine to the mill at Conda is not adequately identified.

3. Groundwater studies are lacking and design of water control facilities are lacking.

4. Sediment catchment basin design is too generalized, more detail is required.

5. Monitoring of collected water in catchment basins and the reporting of water analysis are not discussed.

The following is taken from the mining plan submitted by the J. R. Simplot Company to the Conservation Division, U.S. Geological Survey, Pocatello, Idaho, on December 31, 1974, and from interviews with company representatives.

A. PROPOSED MINING OPERATIONS

The proposed mining panels are on the west limb of the Trail Creek Syncline. The Meade Peak Member strikes generally northwestward and dips about 20° E. The area is a dip-slope outcrop with a thick capping of Rex Chert. This thickness tends to offset the low stripping ratio which might otherwise be expected.

The ore is of unusual thickness and good quality. The main bed is especially thick, averaging 8.5 feet. Information on the intermediate and upper zones will not be available until the exploration drilling program is complete.

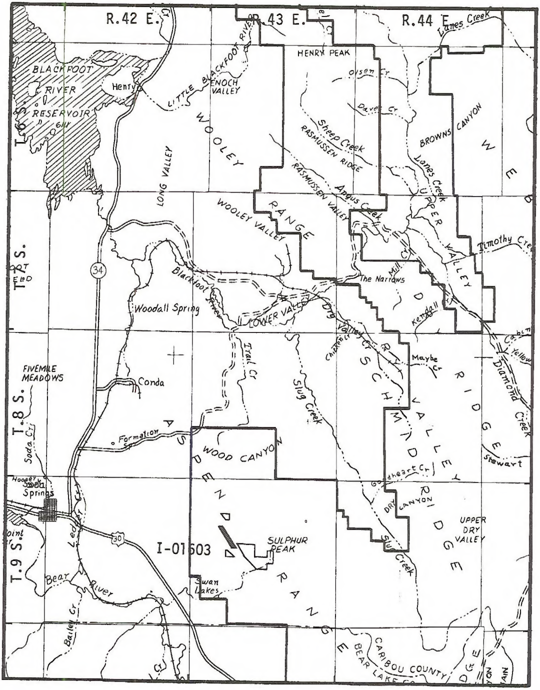

Figure 10-4.--Location of Federal phosphate lease for the proposed Middle Sulphur Canyon mine. Pattern shows area of proposal.

Mining will begin in the south portion of the panel (fig. 10-5) where the high chert knob will be stripped down to the level of the footwall ore outcrop at about the 7,400-foot elevation. Stripping will be done by shovels and twin-engine and single-engine scrapers. Push tractors will assist loading and maintaining the dump area. When the hanging-wall ore outcrop is reached at an altitude of about 7,480 feet, the ore will be mined down-dip in 15-foot vertical lifts. These lifts will be mined with a slight grade northward to facilitate drainage. As the pit is lowered, benches will become increasingly longer from south to north. Waste will be moved over a haul road with a 10 percent favorable grade to the waste disposal site west of the footwall ore outcrop at about 7,440-foot altitude. The draw will then be backfilled from the top down. A series of terraced benches will be constructed into the canyon waste storage area. Benches will grade laterally at 2 percent to facilitate runoff. Because of heavy snow accumulation and later runoff characteristics on the disposal area slopes, benches will be 50 feet wide and 50 feet high, resulting in a backslope of 2:1.

Mining will begin in a small fault block which extends northward into the leasehold from patent land on the southwest. This is designated in the mining plans MS-5. The block has been downthrown and dips about 45° E. The block contains about 200,000 tons of ore. Waste generated in mining the MS-5 fault block, about 300,000 bank cubic yards, will be stacked in a small draw west of the panel. This waste disposal area is on the northern portion of the Fox Claim immediately west of the lease parcel. In the latter phases of mining the MS-4 panel, the MS-5 pit will be backfilled and the MS-5 waste disposal area will be covered by waste stacked over the entire area in conjunction with this mining of the later phases of the MS-4 panel. Mining will then continue in the MS-4 panel.

The mining of about 27 benches of ore in the MS-4 panel will recover about 5 million tons of ore and create about 17 million cubic yards of waste. The plan allows for mining the MS-4 panel down to the 7,090-foot elevation, but the pit could be mined deeper if ground water problems do not become severe and adverse grades from the pit to the waste disposal site can be negotiated. According to the mining plan, if the average 20° E. dip of the formations is maintained at depth, waste could be stacked on the mined-out footwall above the pit floor. There would be room for at least 20 million cubic yards of capacity in the canyon waste disposal area. Consequently, all stripping from the panel in this initial phase of development could be stacked in the canyon, just west of the panel.

Access will be via a major haul road to be constructed west of the panel. Initially, access road from the pit will grade down the west slope of the ridge and connect with the major haul road located in the draw. When the pit floor has reached approximately the 7,300 foot level, access to the pit will be through the north end with the roads grading from the south end of the panel out through the north end into Middle Sulphur Canyon.

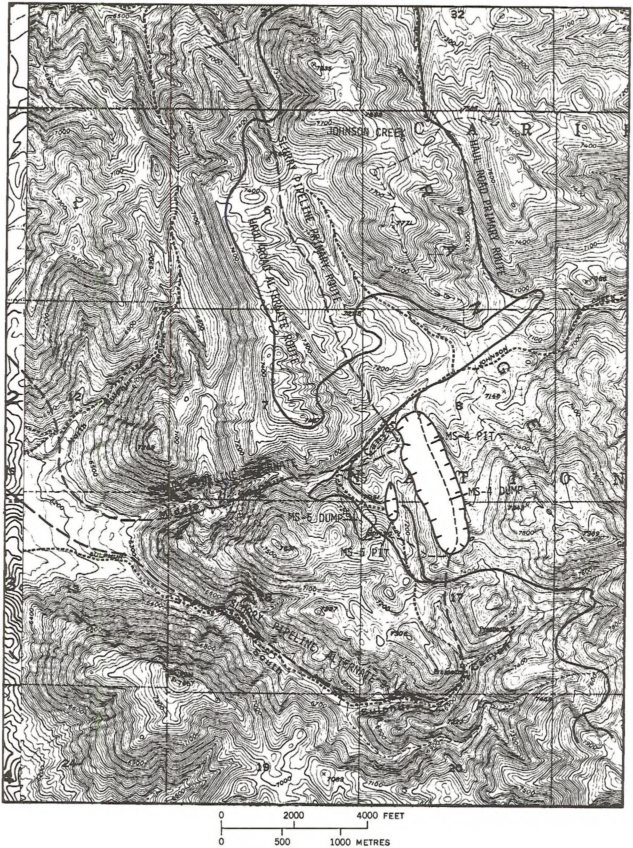

Figure 10-5.--Mining plan proposed for the Middle Sulphur Canyon site.

B. RECLAMATION

Stockpiled topsoil will be used to surface the waste disposal areas and the pit backfill areas.

Some backfilling may be done. The waste can be reshaped to approximate the original topography. If the reshaped overburden pile is not covered with topsoil, bulldozers can rip the surface to a depth of 3 feet to improve seedbed conditions. The ripped area will be planted with a mixture of legumes, such as sainfoin or alfalfa, and grasses at 20 pounds per acre. Manchar bromegrass will be seeded on the wetter east- and north-facing slopes, and intermediate wheatgrasses used on the dry south and west slopes.

C. SURFACE FACILITIES

Any buildings or other surface facilities needed in support of mining operations in this area will be located on patented claims. Logistical support for this extension of an ongoing mining operation will be provided from Conda.

The ore will be trucked over a private haul road to the company's beneficiating plant at Conda and then shipped by rail to the Simplot fertilizer plant at Pocatello. Simplot is considering a slurry pipeline as an alternative to trucking the ore to Conda.

CHAPTER II
DESCRIPTION OF THE EXISTING ENVIRONMENT

A. NATURAL ENVIRONMENT

1. CLIMATE

The climate of the region is generally described in Part 1. Temperatures at the minesite average 3 to 5 degrees below those at Conda, and the growing season is shorter. Precipitation averages about 25 inches annually, and both snowfall and precipitation are greater than at Conda. Topography, aspect, and the direction of prevailing winds indicate sizeable drifts may form on the east side of the proposed minesite and that the west side may be swept bare, as reported by the Idaho Bureau of Mines and Geology for Dry Valley (Ralston and Trihey, 1975). However, the forest cover on the area may alter this pattern significantly. Snowmelt is delayed considerably on the north slope, and snow lingers on the minesite considerably longer than on southwest-facing slopes at comparable elevations.

2. LAND RESOURCES

a. Land Surface

The proposed Middle Sulphur Canyon mine is about 2 miles west of Sulphur Peak in the Aspen Range, between Middle Sulphur and South Sulphur Canyons. The mine area has a relief of about 500 feet.

b. Geology and Mineral Resources

The minesite includes two outcrops of the Phosphoria Formation, one of which is in a small fault block. The beds strike N. 30° W., dip about 20°-40° northeast, and are part of the west limb of the Trail Creek syncline. The south end of the main mine area is marked by faults. The Meade Peak is about 160 feet thick, and the lower and upper ore zones total about 30 feet. The company plans to produce about 5 million short tons of phosphate rock. Estimates of the total resources of some potentially economic elements in the phosphate ore are: 120,000 short tons of fluorine, 550 short tons of uranium, 4,000 short tons of vanadium, and 5,000 short tons of rare earths.

c. Soils

The distribution of landtypes is shown in figure 10-6; soil characteristics are given in table 10-2. The following landtypes occur on the leasehold:

Landtype	Area (acres)
12	35
45	77
45-1	35
52	298
52-1	110
53	40
71-2	35
71-3	58

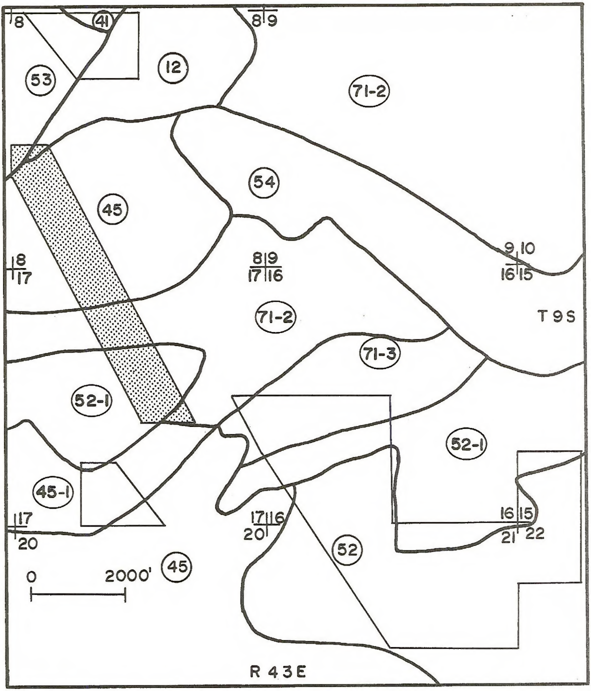

Figure 10-6.--Landtypes near the Middle Sulphur Canyon site. Pattern shows area of proposal.

Table 10-2.--Physical characteristics of soils at Middle Sulphur Canyon minesite. VL = very low, L = low, M = moderate H = high, VH = very high

Land-type	Soil families	Percent of area	Erosion, in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road construction hazard	Slope range, in percent	Revegetation potential
				Depth, in inches	Suitability					
12	Cryic Pachic Paleoborolls, clayey-skeletal, montmorillonitic	40	.003	20	H	7.1	L	L	10-20	VH
	Argic Cryoborolls, fine, montmorillonitic	60	.005	8	M	10.0	M	L	10-20	VH
45	Typic Cryoborolls, loamy-skeletal, mixed	30	0.009	8	M	4.5	VL	L	20-25	L
	Mollic Cryoboralfs, loamy-skeletal, mixed	50	.021	6	L	8.8	L	M	35-50	M
	Argic Cryoborolls, fine-loamy, mixed	20	.024	8	L	6.0	M	H	40-60	M
45-1	Lithic Cryoborolls, loamy-skeletal, mixed	60	.023	4	L	3.4	VL	M	30-60	VL
	Pachic Cryoborolls, loamy-skeletal, mixed	40	.018	12	M	4.3	L	H	40-60	H

Table 10-2.-Physical characteristics of soils at Middle Sulfur Canyon minesite--Continued

Land-type	Soil families	Percent of area	Erosion, in inches per year	Topsoil potential Depth, in inches	Topsoil potential Suit-ability	Avail-able water capacity	Mass fail-ure hazard	Road construc-tion hazards	Slope range in percent	Revege-tation poten-tial
52	Typic Cryoborolls, fine-loamy, mixed	45	.005	8	M	7.0	L	M	30-45	M
	Typic Cryorthents loamy-skeletal, mixed	25	.007	6	M	5.2	L	M	40-50	M
	Argic Cryoborolls, loamy-skeletal, mixed	25	.051	10	H	4.5	VL	H	45-60	VL
	Lithic Cryoborolls, loamy-skeletal, mixed	5	.172	6	L	3.4	M	VH	50-60	VL
71-2	Typic Cryoborolls, loamy-skeletal, mixed	30	.021	6	L	8.8	L	M	35-50	M
	Argic Pachic Cryoborolls, loamy-skeletal, mixed	10	.048	10	M	5.7	VL	L	30-40	M
	Argic Pachic Cryoborolls, fine, montmorillonitic	30	.016	10	M	7.5	L	M	40-50	M
	Pachic Cryoborolls, loamy-skeletal, mixed	20	.015	12	M	4.3	L	H	40-60	H
	Lithic Cryoborolls, loamy-skeletal, mixed	10	.028	6	M	3.4	L	VH	20-30	VL

Table 10-2.--Physical characteristics of soils at Middle Sulfur Canyon minesite--Continued

Landtype	Soil families	Percent of area	Erosion in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road construction hazards	Slope range, in percent	Revegetation potential
				Depth, in inches	Suitability					
52-1	Argic Pachic Cryoborolls, loamy-skeletal, mixed	50	.048	10	M	5.7	VL	L	30-40	M
	Pachic Cryoborolls, loamy-skeletal, mixed	20	.013	10	H	4.3	VL	L	25-45	M
	Cryic Pachic Paleoborolls, fine-loamy, mixed	20	.008	10	M	9.2	L	M	30-50	H
	Argic Lithic Cryoborolls, loamy-skeletal, mixed	10	.006	0	L	1.3	VL	VL	10-30	VL
53	Cryic Paleoborolls, fine-loamy, mixed	25	.007	10	H	7.4	M	M	25-45	VH
	Argic Cryoborolls, clayey-skeletal, montic	10	.005	8	L	6.2	M	M	30-50	H
	Pachic Cryoborolls, loamy-skeletal, mixed	45	.018	12	M	4.3	L	H	40-60	H
	Typic Cryorthents, loamy-skeletal, mixed	20	.007	6	M	5.2	L	M	40-50	M
71-3	Lithic Cryoborolls, loamy-skeletal, mixed	40	.028	6	M	3.4	L	VH	20-30	VL
	Cryic Pachic Paleoborolls, fine, montmorillonitic	60	.016	10	M	7.5	M	H	40-50	H

Landtype 12 consists of gently to moderately sloping toeslopes and colluvial slopes along the lower sides of the valley slopes. The soils are deep, with loam surfaces over clay loam to clay subsoils. The substratum is several feet of gravels and cobbles.

Landtype 45 occurs on north aspects of steep-sided canyon slopes. Bedrock is deeper than five feet throughout most of the unit. The soils are moderately deep to deep loams, and the substratum is moderately weathered and extremely well fractured.

Landtype 45-1 occurs on south- and west-facing slopes of steep canyon sideslopes. The soils are shallow and moderately deep, with bedrock occurring from 1 to 3 feet. The soils are gravelly loams over bedrock.

Landtype 52 and 52-1 are described in Part 4.2, Chapter II; landtype 53 in Part 5.2, Chapter II.

Landtype 71-2 occurs on all aspects of low-relief foothills with convex and concave slope shapes. The soils are typically deep, loamy-skeletal on 60 percent of the landtype; and deep fine, montmorillonitic on 30 percent of the landtype. The substratum is several feet of well-fractured, well-weathered sandstone and shale colluvium.

Landtype 71-3 occurs on all aspects of smooth, low-relief foothills with many seeps and springs. The soils are moderately deep, loamy surfaces with clayey and loamy, skeletal subsoils. The substratum is several feet of well-fractured, well-weathered sandstones and shales.

3. WATER RESOURCES

a. Water Supply

1. Surface Water

Surface flow in Middle Sulphur Canyon seeps into the bed of the canyon about one-fourth mile below the proposed mine. Middle Sulphur Canyon is ephemeral throughout its length. The drainage area above the proposed pit is about 110 acres. Runoff from this area is uncertain because of the unknown patterns of snow drifting, but could average as much as 18 inches annually; about 150 acre-feet of water could thus drain into the mine area annually. On June 5, 1975, flow in middle Sulphur Canyon opposite the mine was estimated at 4 cfs. Based on high water marks, an earlier flow was estimated at 45 cfs. Neither flow continued more than about one-fourth mile below the minesite. Water flows beyond this point only during extreme events.

South Sulphur Canyon is perennial and dominantly springfed during all but the snowmelt season. However, just downstream from the National Forest boundary, the flow is absorbed by the valley fill, and for a short distance of about 200 yards there is no discrete surface channel.

2. Ground Water

The water-bearing character of the older formations at the site is unknown; however, these formations are permeable and accept water readily. In June, 1975, runoff estimated at 45 cfs disappeared into the alluvium and the underlying older formations in the distance of about two hundred yards below the proposed pit site.

Available drill-hole data for the footwall ore zone indicate that ground water does not occur in the Meade Peak Member at altitudes higher than the bottom of Middle Sulphur Canyon. However, since the pit will be dug to about 100 feet below the canyon bottom, ground water may be encountered in the pit.

b. Water Quality

There are no data on water quality for the Middle Sulphur Canyon area. The water quality, including sediment, should be similar to that of nearby proposed minesites, notably the Swan Lake Gulch site (see Part 4.2).

4. AIR RESOURCES

The present air quality near the proposed minesite is good. Minor amounts of dust, vehicle emissions, and particulates occur along roads.

5. VEGETATION

Roughly equal areas of conifer-aspen and sagebrush-grass cover the Middle Sulphur Canyon site. Forage production ranges from 400 to 1,400 pounds per acre air dry weight. Timber is uneconomical to harvest.

No rare or endangered plants are known on the site.

6. WILDLIFE

About 25 elk winter each year in Middle Sulphur Canyon near the minesite. Although no specific elk calving grounds have been identified, 10 to 25 elk inhabit the area year-long and calve somewhere in the canyon. During winters of extreme snowfall and cold, more than 40 elk have been observed on Rabbit Mountain. These elk are believed to migrate through North Trail Canyon, Wood Canyon, and Middle Sulphur Canyon. Although precise migration routes are not known, most are believed to move through and from Sulphur Canyon.

As many as 150 deer inhabit the Middle Sulphur Canyon areas year-long. Winter counts of deer in the Sulphur Canyon average about 400, with a high of over 600 in 1967. Mule deer are known to migrate from Wood Canyon and Middle Sulphur Canyon to Rabbit Mountain and adjacent areas. Two important migration routes border the leasehold. Most of these deer are believed to be coming from Sulphur Canyon. Counts of deer in the Rabbit Mountain area decreased from 351 deer in 1972 to 155 deer in 1974. In 1973, the Idaho Fish and Game Department began trapping deer from Rabbit Mountain area, as the winter range has been greatly reduced by suburban growth.

Between 10 and 15 moose inhabit Sulphur Canyon year-round. The area is a good to excellent black bear habitat, and black bear are regularly sighted in Middle Sulphur Canyon. Cougar have been infrequently sighted in the area.

A flock of about 25 sage grouse was observed on the north ridge of Middle Sulphur Canyon in the winter of 1974. Both blue and ruffed grouse also inhabit the area year-round. Snowshoe and cottontail rabbits are present.

Some 13 species of birds of prey occur within the area, four during spring and fall migrations and summer, two during winter, and seven only occasionally. Populations are unknown. Many species of song and insectivorous birds inhabit the area, some only during migration.

Major fur-bearing species likely to be found in the area are fox, bobcat, weasel, coyote, spotted and striped skunk, and badger. Fisher, pine martin, and Canada lynx could occur but have not been sighted recently. Beavers are present in the lower reaches of Middle Sulphur Canyon.

Waterfowl habitat is limited to the vicinity of a large artesian spring that rises at the mouth of Middle Sulphur Canyon. Puddle ducks such as mallard, widgeon and teal, have been observed, but it is not known if they nest there.

Some 40 other species of small mammals, especially rodents and bats, are likely in the area, and most species of reptiles and amphibians common to the region are present.

Three threatened, endangered, or nationally significant species probably exist in or near Middle Sulphur Canyon. Peregrine falcons probably nest in the canyon in niches in sheer cliffs', however, no nests are known. Prairie falcons are commonly sighted in the canyon; they also nest in niches and prey on dense populations of ground squirrels. Golden eagles occur year-round in the area. Immature golden eagles have been observed in Middle Sulphur Canyon, indicating they were raised in or near the canyon. No bald eagle nests have been documented, but Middle Sulphur Canyon is a known traditional wintering area for bald eagles.

7. FISHERIES

The proposed minesite is in mainly ephemeral drainages that do not support fisheries.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Agriculture near the Middle Sulphur Canyon lease is limited to dry-land farming on the canyon slopes and meadow pastureland near Middle Sulphur Creek, 2 miles west of the lease. From July 1 to August 31, 1,000 sheep are permitted on and near the leasehold. Each year they consume about 100 sheep months of forage, valued at $155, from the leasehold. The acreage to be disturbed by mining is about 5 percent of the allotment.

2. SOCIOECONOMIC DEVELOPMENT

The Middle Sulphur Canyon minesite is used mainly for grazing.

3. TRANSPORTATION AND UTILITIES SYSTEMS

Approximately one mile of the Sulphur Creek-Johnson Creek Road lies within the Middle Sulphur Canyon leasehold or adjoining patented mining claims. The road leaves U.S. 30 N. approximately 3 miles southeast of Soda Springs, proceeds up South Sulphur Canyon to the Sulphur Creek-Johnson Creek drainage divide. It then proceeds down Johnson Creek and joins the Wood Canyon Road in the Slug Creek drainage. This road is single-lane, unsurfaced, with segments of grade greater than 7 percent. The road receives limited use during the late spring, summer and fall, primarily for recreation and mining-related activites.

With the exception of primitive drilling access roads, no additional transportation or utilities systems are located within the lease area boundaries.

4. RECREATION RESOURCES

The Middle Sulphur Canyon area provides quality outdoor recreational opportunities for big-game and grouse hunting and for year-around off-road vehicle use. In addition, numerous visitors use nearby transportation routes for pleasure driving. It is possible to use the proposed site for recreation purposes year round, but fall attracts the most use.

No facilities have been developed primarily for recreation, but the area has potential for a variety of recreational activities including hunting, ORV use, driving for pleasure, picnicking, camping, hiking, and horseback riding.

The remoteness quality of the area is diminishing because of its proximity to Soda Springs and U.S. Highway 30N and the presence of other mines in the area.

5. ARCHEOLOGIC AND HISTORIC VALUES

Subsequent to the Draft statement, Blaine Miller, an archeologist with the Forest Service, made a cultural inventory of the leasehold. No artifacts were recovered, nor was there any evidence of prehistoric cultures. No historic sites are recognized on the leasehold. An archeologic clearance was recommended by Richard L. Harris, Director, Recreation, Lands and Minerals, U. S. Forest Service.

6. AESTHETICS

The variety class for the area is rated low. The minesite is in the middleground viewing zone of the U.S. Highway 30, and the orehaul corridor in the foreground viewing zone.

CHAPTER III
ENVIRONMENTAL IMPACTS

A. NATURAL ENVIRONMENT

1. LAND RESOURCES

a. Land Surface

Mining will create 113 acres of pits and 57 acres of dumps. Roads, buildings, and other facilities will modify 173 acres; the mining plan identifies 7.5 acres of pit, 57 acres of dump, and 9 acres of road on the Federal leasehold. There will be two pits: the smaller, 1,100 feet long, 300 feet wide, and 100 feet deep; and the larger, 4,200 feet long, 1,100 feet wide, and 350 feet deep. The smaller pit will be completely backfilled. Waste rock will amount to 18 million cubic yards. The waste piles will be smoothed and will have a low profile.

b. Geology and Mineral Resources

Mining will remove 5 million short tons of phosphate rock, which will include 120,000 short tons of fluorine, 550 short tons of uranium, 4,000 short tons of vanadium, and 5,000 short tons of rare earths.

c. Soils

Mining will disturb soils on 170 acres, at the rate of about 60 acres per year. An additonal 170 acres will be disturbed off the site for haul road.

2. WATER RESOURCES

a. Water Supply

1. Surface Water

Peak flows past the Middle Sulphur Canyon minesite could reasonably exceed 75 cfs. The proposed settling ponds may prove ineffective. Flow of 75 cfs in Middle Fork Sulphur Canyon during prolonged high runoff may not completely infiltrate the ground, and may continue into the Bear River. Flow to Bear River, however, appears unlikely unless sediment seals the channel.

2. Ground Water

Ground water will seep into the Middle Sulphur Canyon pit below the canyon bottom; quantities will probably be small. Ground water drained from the pit into Middle Sulphur Canyon will probably go no further than about 1/4 mile to where the stream dries up. Slurry transport, being considered for the Middle Sulphur Canyon site, may increase the concentrations of some less desirable constituents in ground water.

b. Water Quality

The Middle Sulphur Canyon mine will contribute sediment to the Middle Fork of Sulphur Canyon, Johnson Creek, and the South Fork of Sulphur Canyon.

Sediment yields in Johnson Creek from the headwaters to the confluence with Dry Fork of Johnson Creek are estimated to increase to 1¼ times as a result of mining. This amount of increase is negligible.

The sediment yield of the South Fork of Sulphur Canyon from the headwaters to the National Forest boundary is estimated to increase to 1½ to 3 times the existing sediment load as a result of mining. Neither the existing stream channel nor aquatic habitat are likely to be affected by the low yield.

The estimated sediment yields in middle Sulphur Canyon will increase during mining to 10 to 20 times the present conditions and then decline after mining to 8 to 15 times the present conditions. The present rates of sediment production are considered to be very low; mining will increase these rates to high. The sediments could seal the recharge zone, and surface flows down Middle Sulphur Canyon would become common. Such flows would likely cause erosion in the steep channel and could damage farm fields at the mouth of the canyon. It is conceivable, but unlikely, that these flows would have enough volume and velocity to carry the increased sediment to the Bear River. It is also possible that the recharge zone in Middle Sulphur Canyon is large enough and porous enough to be unaffected by the predicted increase volume of sediment.

3. AIR RESOURCES

Impacts will be small, and similar to those described in Part 1.

4. VEGETATION

At Middle Sulphur Canyon, mining will progressively remove vegetation from 343 acres, of which 74 acres--about half conifer-aspen and half sagebrush-grass--are on the Federal leasehold.

5. WILDLIFE

Loss of elk calving areas and summer range will cause the loss of about 25 elk to adjacent areas with stable or slightly increasing populations. Some critical winter range will also be lost, and migration routes to the winter range will be disrupted. Of the 40 or so elk that winter in the canyon, probably less than 10 will remain.

About 150 of the estimated 460 deer in the area will be lost. Many of these ranges are in poor condition; further overgrazing will reduce the overall deer population. An important migration route will be blocked.

Most of the 10 to 15 moose that inhabit the Sulphur Canyon area year-long will probably abandon the area or use it only sporadically. Loss of suitable habitat will reduce the incidence of mountain lion and black bear.

A major part of the blue grouse winter range will be lost, resulting in reduction or loss of the blue grouse populations. Raptors will be lost. Both cottontail and snowshoe rabbit populations will also be reduced. Mining will reduce populations of other furbearers, such as badger, bobcat, coyote, skunk and weasel, and of non-game species of birds, mammals, reptiles, and amphibians. There will be little or no impact on waterfowl.

The proposed mine will be above the hunting and possible nesting habitats of peregrine and prairie falcons in Middle Sulphur Canyon. Resident falcons could abandon the area except for occasional visits during late summer, fall, and winter. Golden eagles will be significantly reduced. An aerie, probably for golden eagles, that is known to be in the Sulphur Canyon area could be lost or rendered unsuitable. A wintering area for the bald eagle could also be lost.

6. FISHERIES

Because the mining area is not near perennial water bodies that support fisheries, there will be no direct effects on fisheries. Water from the Middle Sulphur Canyon could reach the Bear River during snowmelt and storms. The resulting effect on the system, however, is considered minor.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Forage will be progressively removed from 343 acres of rangeland, of which 74 acres are on the Federal leasehold, with an average annual production of about 500 to 700 pounds of usable forage per acre, air dry weight. During the life of the mine, about 100 sheep months, valued at $155 annually, will probably be lost on the entire site; some additional forage may be lost on adjacent lands.

2. SOCIOECONOMIC DEVELOPMENT

The proposed mine will employ about 135 people when fully operational. The socioeconomic impacts on the site from this proposal are minimal and by themselves are not significant, but they contribute to the regional socioeconomic impacts as described in Part 1.

3. TRANSPORTATION AND UTILITIES SYSTEMS

The larger pit will border the Sulphur Canyon-Johnson Creek road; nearly 1 mile of the road will be up graded and used for ore transport.

4. RECREATION RESOURCES

The proposed mining will have major impacts on big-game and grouse hunting, and on ORV and pleasure driving.

5. ARCHEOLOGIC AND HISTORIC VALUES

No known site will be impacted.

6. AESTHETICS

The Middle Sulphur Canyon minesite is in the middleground viewing zone of U.S. Highway 30 N, which is a primary travel route. The topography surrounding the site will screen some of the proposed disturbance, so impacts will be moderate. The ore-haul system will be in the foreground and will have high visual impact.

CHAPTER IV
MITIGATING MEASURES

Mitigating measures that apply to both the North Trail Canyon, and Middle Sulphur Canyon proposals are discussed in Part 10.1, Chapter IV. These shall be required at this site.

The following proposals for mitigation of impacts are taken directly from Simplot's mining plan for the Middle Sulphur Canyon site.

The smaller pit will be completely backfilled, and the larger pit partially backfilled. All the phosphate resource will be extracted from the smaller pit. Because of the low dip of the beds in the larger pit, backfilling will not cover up unexploited phosphate resources.

Simplot proposes to channel drainage from the pit area into a catchment basin. Runoff from the dump will be channeled along contour and drained laterally onto natural ground and through a catchment pond to prevent erosion. The company plans indicate that below the floor level of Middle Sulphur Canyon, water will have to be channeled into sumps and allowed to percolate into the underlying strata, or else be pumped out of the pit and contained in a catchment basin. The company also states that runoff from the disturbed area will not enter any receiving waters. However, water from the mine will probably infiltrate into the ground downstream from the pit.

Further site-specific mitigating measures that should be required at the Middle Sulphur Canyon site include the following.

The proposed dumps on critical big game winter range should be relocated to less critical areas if feasible. Alternative routes for haul roads, conveyor lines, etc. should be inventoried to determine the feasibility of avoiding critical grouse habitat. The mining plan should be modified to preserve the habitat of the endangered peregrine falcon and bald eagle wintering areas. The degradation of the stream in Middle Sulphur Canyon and the associated riparian habitat critical to wildlife species should be held to a minimum.

Additional hydrologic data should be obtained to determine the adequacy of the design of water-control structures and the potential for altering groundwater recharge.

CHAPTER V
ADVERSE EFFECTS THAT CANNOT BE AVOIDED

Changes in the land surface configuration are unavoidable (fig. 10-7); of the 173 acres which will not be reclaimed, about 17 are on the Federal leasehold.

Mining will disturb soils on 343 acres, of which 74 acres are on Federal lands.

Because sediment loads will likely be high, the channel of Middle Sulphur Canyon may become sealed with sediment, and flow might thus reach Bear River during snowmelt seasons.

Some additional dust and vehicle emissions during mining are unavoidable.

Vegetation will ultimately be removed, from 343 acres, 74 of which are on the Federal leasehold. About 200 acres will be cleared at any one time during most of the life of the mine. Annual forage production on 170 acres of reclaimed land will probably not exceed 200 to 700 pounds per acre, air dry weight--about half the present value. Production on 173 acres of unreclaimed roads and pit will be lost; less that 17 acres of unreclaimed land will be on the Federal leasehold.

Alteration of critical elk and deer winter range will cause the loss of an estimated 25 elk and at least 150 deer. Significant migration routes could be blocked, thereby big game movement. Between 10 and 15 resident moose will abandon the area. The area will be little used by the mountain lion and black bear.

Sage grouse and forest grouse will be adversely affected, to a degree that cannot be determined at this time, and the mourning-dove population will be reduced. A golden eagle aerie and a bald-eagle wintering area could be abandoned. Prey areas for the peregrine falcon and other raptors will be reduced.

There will be no unavoidable adverse impacts to fisheries with proper sediment control and rehabilitation methods.

Forage will ultimately be removed from 343 acres of rangeland, of which 74 acres are on the Federal leasehold. Average annual production of usable forage on about 170 acres of reclaimed land will probably not exceed 250 to 350 pounds per acre, air dry weight. Forage on 173 unreclaimed acres will be lost; less than 17 unreclaimed acres will be on the Federal leasehold.

There will be no significant adverse socioeconomic impacts. The cumulative adverse effects that cannot be avoided on a regional scale are described in Part 1.

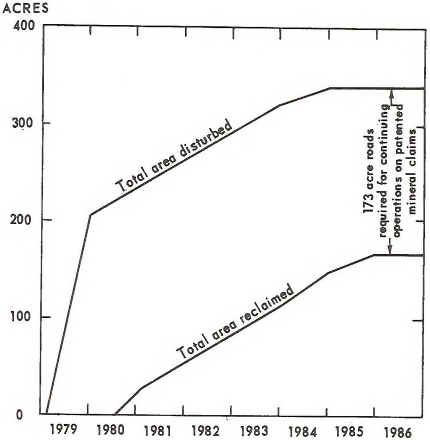

Figure 10-7.--Land disturbance and reclamation, Middle Sulphur Canyon site. Less than 17 acres of unreclaimed land will be on the Federal leasehold.

Impacts on on recreation will be major, mainly through reduction of hunting opportunities.

At Middle Sulphur Canyon, an ore haul system will penetrate the foreground viewing zone of U.S. 30 N., a primary travel route, so aesthetic impacts will be high.

Truck movement associated with mining will conflict with other traffic on nearly 1 mile of the Sulphur Canyon-Johnson Creek road.

CHAPTER VI
SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

In the short term, from about 1979 through 1984, about 5 million tons of phosphate rock will be removed from the leasehold for processing into fertilizer. Mining will disturb soils on about 74 acres on the Federal leasehold (plus 269 acres off the leasehold), and move about 18 million cubic yards of overburden and bedrock. During mining, there will be local short-term lowering of the air quality from dust and vehicle emissions.

During mining, vegetation will be progressively removed from 343 acres, 74 acres of which are on the Federal leasehold; forage production of 400 to 1,400 pounds per acre, air dry weight, will be lost on about 200 acres at any given time. Wildlife populations will be disrupted. About 25 elk, 150 deer, and up to 15 moose which inhabit the area will be displaced to adjacent ranges at or near carrying capacity. On the minesite, about 100 sheep months of forage, valued at $155 annually, will be lost during mining, because most of the site will probably not be available for grazing. The aesthetics of the area and its recreation resources will be lowered during and following the mining operation.

Long-term productivity of the area will be decreased. Although the pits may be partially backfilled, it is not likely that vegetation on the disturbed soils will recover to premining levels. Annual forage production on 170 acres of reclaimed land will probably not exceed 200 to 700 pounds per acre, air dry weight--about half the present value. Production on 173 acres of unreclaimed roads and pit will be lost; less than 17 acres of the unreclaimed land will be on the Federal leasehold. Some long-term reduction in game herds--especially deer, elk, and moose--will result from competition on nearby ranges from the displaced animals. Average annual production of usable forage on 170 reclaimed acres will probably not exceed 250 pounds per acre, air dry weight. On the entire site, average production of usable forage of about 75 sheep months valued at $120, will be lost annually. The landscape will be further modified by the additional mining in the area.

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CHAPTER VII
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

About 5 million short tons of phosphate rock will be mined and processed by 1985. This is irretrievable. This ore contains an additional 0.12 million short tons of fluorine, 4,000 short tons of vanadium, 550 short tons of uranium, and 5,000 short tons of rare earths, which will be removed but not recovered. The landscape change through creation of pits and dumps is largely irreversible. The mixing of soils and attendant full loss of productivity of 113 acres and partial loss on 57 more acres is irreversible. Loss of wildlife, to the extent that it cannot relocate successfully, is irretrievable. The character of the area will be irreversibly and irretrievably committed to the further intrusions of mining-related changes.

The mining and reclamation will require about 3 million gallons of diesel fuel, and 200,000 gallons of gasoline.

Transporting the ore to Conda will require about 2.4 million gallons of diesel fuel.

Beneficiating the ore at Conda will require about 39 million kilowatt hours of electricity, 20,000 gallons of gasoline, and about 7,000 acre-feet of water.

Rail transportation of the beneficiated rock to Pocatello will require about 970,000 gallons of diesel fuel.

Converting the beneficiated rock into fertilizer will require about 440 million kilowatt hours of electricity, 16 billion cubic feet of natural gas, 20,000 gallons of gasoline, and 4.5 million tons of sulfuric acid.

CHAPTER VIII
ALTERNATIVES

The general administrative options available to the Secretary of the Interior are discussed in Part 1. Rejection of the Middle Sulphur Canyon proposal would prevent Simplot from mining an unknown portion--perhaps as many as 500,000 tons--of the ore on adjacent patented lands.

The following alternatives apply specifically to the Middle Sulphur Canyon site. Simplot proposes the possibility of partial backfilling. The alternative of replacing all the waste would eliminate the dumps and nearly fill the pits. The proposed alternative slurry lines would probably have less impact than the haul road; proposed alternatives 1 and 2 would have less impact than alternative 3 in that they are lower on the slopes of the Aspen Range, thus in a less fragile environment, and largely outside deer and elk winter range.

PART 11

STAUFFER CHEMICAL COMPANY

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WOOLEY VALLEY UNIT 3 MINING PLAN

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PART 11
STAUFFER CHEMICAL CO.

Stauffer Chemical Company production is diversified into industrial, agricultural, and specialty chemicals; plastics; and food ingredients. Industrial chemicals include chlorine, caustic soda, and sulfuric, muriatic, and phosphoric acids. Food-grade phosphate is one of the company's specialty chemicals. In addition to their mining in southeastern Idaho, the company mines phosphate in Utah, Wyoming, and Tennessee for domestic sales and internal use in fertilizer plants and other company operations.

Stauffer operates the Wooley Valley Mine, one of the four ongoing mines in the study area. This mine has been operating since 1967, and its current 0.75 million tons annual production will deplete the ongoing reserves by 1982. A northern extension of the Wooley Valley mine, known as Unit 3 (Little Long Valley) is a new proposed mine, which is scheduled to produce about 5 million tons of phosphate rock through 1983. When the Wooley Valley mine and Unit 3 are phased out in 1983, the company proposes to bring into production the Rasmussen Ridge mine. This mine is scheduled to produce 1.2 million tons annually through 1997.

These mines will be operated by open-pit methods and will involve Federal phosphate leases and special land-use permits.

The unbeneficiated raw rock is presently shipped by unit train to processing plants in Silver Bow, Montana and Leefe, Wyoming. The company does not anticipate a processing plant in the area.

PART 11.1
WOOLEY VALLEY UNIT 3 MINING PLAN

CHAPTER I
DESCRIPTION OF PROPOSED ACTION

The proposed project is on the east slope of the Wooley Range, about 15 miles northeast of Soda Springs (fig. 11-1). The plan involves Federal phosphate leases I-04373 and I-97, plus 23 special-use permits for 156 acres adjoining the leases, which will be used for roads, catchment areas, etc. The two Federal leases total 775.72 acres; 40 acres are privately held, and the remaining 736 acres are on National Forest land.

Unit 3 minesite has neither been mined nor developed. It has, however, been thoroughly explored.

A partial conditional approval under 30 CFR 321.10 (c) and (f) was granted the Company by the USGS on September 20, 1974. The approval was conditioned upon the Company furnishing data on cross sections, drill holes and drill logs. Until these requirements are met, final consideration of approval or disapproval should not be made.

The following information is from the mining plan submitted to the Conservation Division, U.S. Geological Survey, Pocatello, Idaho, and from interviews with company representatives.

A. PROPOSED MINING OPERATIONS

Mining of Unit 3 is expected to start in 1976. Production of about half a million tons per year is expected.

The mine (fig. 11-2) will be developed in four panels in six phases. Topsoil will first be removed from all areas to be disturbed by the first panel and will be stockpiled. Phases 1 and 2 will open the entire pit to an unstated depth; the waste will be used to construct haul roads, and interceptor ditches and catchments for controlling runoff and reducing the sedimentation to streams. Phases 3, 4, 5, and 6 will mine southward, taking each of the four panels to planned depth. Waste from Phase 3 will be dumped just northeast of the pit. Waste from Phases 4, 5, and 6 will be placed as fill in the previously depleted panels.

Stripping and ore extraction will be done with rubber-tired scrapers, assisted by crawler dozers in loading. Stripping will continue the year around. The ore will be hauled June through October from the pits to an ore stockpile. Ore will be moved from the stockpile by belt conveyor to railroad cars for shipment to the processing plant at Silver Bow, Montana. Some submarginal grade 16 to 18 percent P_2O_5 ore will be stockpiled for future use.

A waste dump will contain about 28 percent of the waste. About 62 percent will backfill the mine pit. The remaining 10 percent will be used in constructing haul roads.

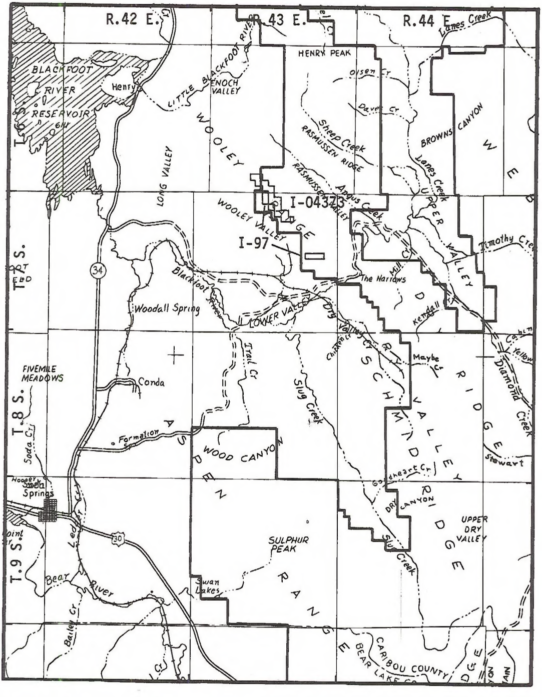

Figure 11-1.--Location of Federal phosphate leases for the proposed Wooley Valley Unit 3 mine.

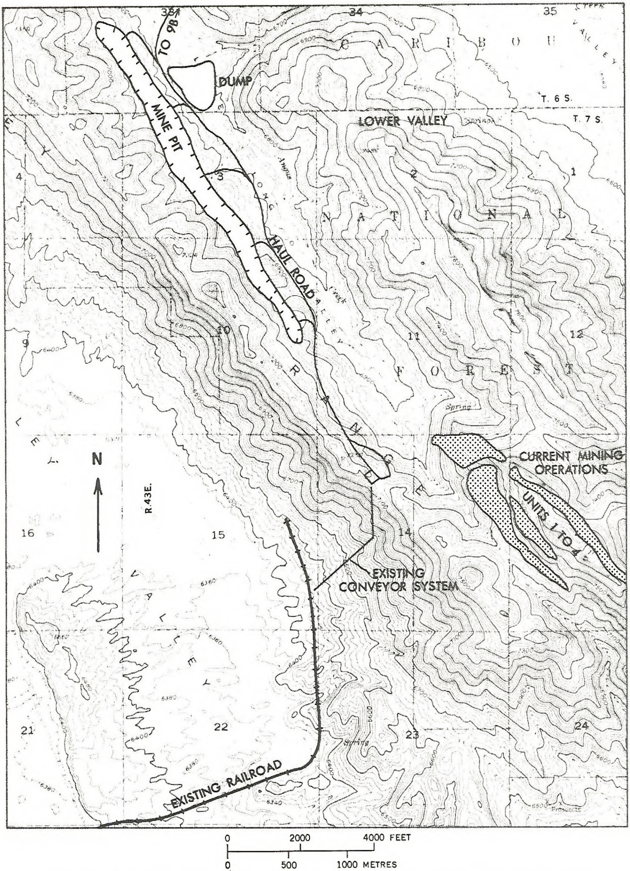

Figure 11-2.--Mining plan proposed for the Wooley Valley Unit 3 site.

The total area to be disturbed by mining is 315 acres, consisting of 129 acres of mine pits, 85 acres of waste dumps, 89 acres of roads, and 12 acres of water-control structures.

B. RECLAMATION

Topsoil from areas to be disturbed is to be stockpiled for use in reclamation. Waste dumps are to be constructed with slopes of 3:1 for stability and to facilitate revegetation. Approximately three-fourths of the mined area will be backfilled with mine waste. Dumps and pit-fill areas will be scheduled for rehabilitation as such areas become inactive or completed. Areas to be revegetated will be covered with topsoil or selected waste shale. In the next appropriate season, these areas will be seeded with grasses and forbs, in accordance with Forest Service recommendations.

C. SURFACE FACILITIES

Unit 3 of the Wooley Valley Mine will use the same facilities as are in current use on the adjacent operating property. Raw ore will be shipped by rail to Stauffer's processing plants at Silver Bow, Montana, and Leefe, Wyoming, June through October.

CHAPTER II
DESCRIPTION OF THE EXISTING ENVIRONMENT

A. NATURAL ENVIRONMENT

1. CLIMATE

The general climate of the region is described in Part 1.

Average temperatures at the minesites are probably a few degrees lower than at Conda, and the growing season is shorter. The minesite is on northeast-facing slopes and thus shaded from direct sunlight during much of the year. Annual precipitation averages about 20 inches. Recent studies by the Idaho Bureau of Mines and Geology (Ralston and Trihey, 1975) indicate that snow accumulations are impeded on the west slopes and increased on the east slopes.

2. LAND RESOURCES

a. Land Surface

The minesite is mainly on the east flank of the northwest-trending Wooley Range. The maximum relief between Little Long Valley and the Wooley Range is about 650 feet.

b. Geology and Mineral Resources

The outcrop of the Meade Peak extends about 2 miles along the Wooley Range and is truncated at both ends by longitudinal faults with large displacement. The Meade Peak beds strike about N. 35° W., dip steeply to the east or west, and are part of the west limb of the Georgetown syncline.

The Meade Peak is 175 feet to 185 feet thick, and the lower and upper phosphate zones total 38 feet to 48 feet. Expected production from the mine is about 5 million short tons of phosphate rock. Estimates of the resources of some significant elements in the phosphate ore are: 120,000 short tons of fluorine, 550 short tons of uranium, 4,000 short tons of vanadium, and 5,000 short tons of rare earths.

c. Soils

The distribution of landtype phases is shown in figure 11-3; soil characteristics are given in table 11-1.

Data for the Wooley Valley mine are from the Soils Report of the Wooley Valley Mine, Caribou National Forest, 1972. The report is based on detailed mapping, which separates landtype phases, each of which includes only a few specific soil families restricted to certain topographic positions, slopes, and vegetation types.

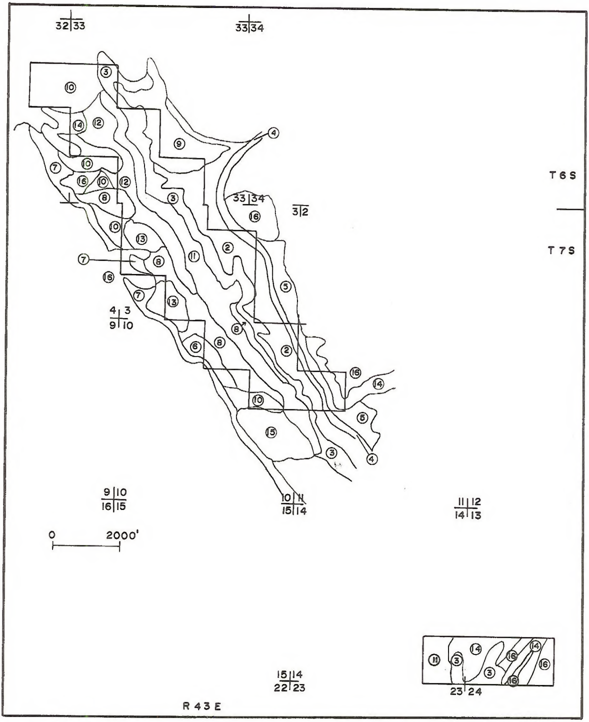

Figure 11-3.--Landtype phases near the Wooley Valley Unit 3 site.

Table 11-1.--Physical characteristics of soils at Wooley Valley Unit 3 minesite. VL = very low, L = low, M = moderate, H = high, VH = very high

Land-type	Soil families	Percent of area	Erosion in inches per year	Topsoil potential		Avail-able water capacity	Mass fail-ure hazard	Road Construc-tion hazards	Slope range, in percent	Revege-tation poten-tial
				Depth in inches	Suit-ability					
2	Argic Pachic Cryoborolls, fine-loamy, mixed	60	0.003	14	H	9.6	VL	VL	3-13	H
	Argic Cryoborolls, fine-loamy, mixed	40	.008	10	H	6.0	VL	VL	0-10	H
3	Argic Pachic Cryoborolls, fine-loamy, mixed	60	.003	12	H	9.6	L	L	5-10	H
	Argic Cryoborolls, fine-loamy, mixed	40	.003	10	H	6.0	L	L	5-10	M
4	Typic Cryaquolls, fine, mixed	100	.001	6	L	4.0	VL	H	0-5	L
5	Argic Cryoborolls, fine-loamy, mixed	100	.008	10	M	6.0	L	L	13-18	H
6	Argic Cryoborolls, loamy-skeletal, mixed, shallow	100	.040	8	L	3.5	M	M	30-45	VL

Table 11-1.--Physical characteristics of soils at Wooley Valley Unit 3 minesite--Continued

Land-type	Soil families	Percent of area	Erosion in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road Construction hazards	Slope range, in percent	Revegetation potential
				Depth in inches	Suitability					
8	Argic Cryoborolls, fine-loamy, mixed	70	0.015	10	M	6.0	M	H	15-25	M
	Argic Cryoborolls, loamy-skeletal, mixed, shallow	30	.015	8	M	3.5	VH	H	15-25	M
9	Argic Cryoborolls, fine, mixed	90	.004	10	H	9.0	VL	VL	2-5	VH
	Argic Cryoborolls, fine, mixed	10	.005	0	L	10.0	VL	VL	2-5	H
10	Typic Cryoboralfs, fine-loamy over loamy-skeletal, mixed	100	.035	10	L	4.5	L	M	40-50	L
11	Argic Prachic Cryoborolls, fine-loamy, mixed	50	.007	12	H	9.6	VL	VL	10-15	M
	Argic Cryoborolls, loamy-skeletal, mixed, shallow	25	.009	8	M	3.5	L	VL	10-15	H
	Argic Cryoborolls, fine, mixed	25	.007	0	L	9.0	VL	L	10-15	H
12	Argic Cryoborolls, loamy-skeletal, mixed, shallow	100	.003	8	M	3.5	VL	L	5-15	VH

Table 11-1.--Physical characteristics of soils at Wooley Valley Unit 3 minesite--Continued

Land-type	Soil families	Percent of area	Erosion, in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road Construction hazards	Slope range, in percent	Revegetation potential
				Depth, in inches	Suitability					
14	Typic Cryoborolls, loamy-skeletal, mixed	100	0.018	12	M	4.5	H	M	30-40	H
16	Lithic Cryoborolls, loamy-skeletal, mixed	70	.158	0	L	3.4	VL	M	50-70	VL
	Typic Cryoborolls, loamy-skeletal, mixed	30	.158	6	L	4.5	L	M	50-70	VL
7	Pachic Cryoborolls, coarse-silty, mixed	70	.015	15	H	4.0	M	H	15-30	VH
	Lithic Cryoborolls, loamy-skeletal, mixed	30	.158	0	VL	3.4	VL	M	10-20	L
13	Argic Cryoborolls fine, mixed, shallow	100	.035	6	L	4.0	M	L	25-35	M

The following landtype phases and acreages occur on the leasehold:

Landtype phase	Acreage
2	70
3	91
4	13
5	13
6	19
7	5
8	45
9	65
10	82
11	123
12	91
13	57
14	61
16	40

Landtype phase 2 occupies east aspects on the lower colluvial toeslopes adjacent to Angus Creek. Slope lengths rarely exceed 800 feet and are as short as 300 feet. Shallow incised drainageways dissect the area prominently. Altitude ranges from 6,700 to 6,900 feet. The soils are not residual and are presumed to be outwash and colluvium from the Wells and Phosphoria Formations. Depth to hard bedrock averages from 10 to 20 feet. The soil in swales and drainageways has thick, very dark brown loamy surface horizons over a dark brown clay loam subsoil. The soil in the higher parts of the unit is similar, except that the surface horizon is less than 20 inches thick.

Landtype phase 3 occupies the upper east-facing toeslopes along Wooley Ridge. This unit has a concave slope, with only narrow dissections. Altitude ranges from 7,000 to 7,250 feet. Depth to hard bedrock is estimated to be at least 8 feet. This unit has two similar soils. The dominant soil over 60 percent of the unit has a thick, dark brown silt loam and loamy surface horizons over a brown sandy clay loam subsoil. The minor soil over 40 percent of the unit is a black silt loam over a dark brown loam surface horizon that overlie a brown sandy clay loam subsoil. The latter soil does not have a thick, dark colored surface horizon over 20 inches thick. The dominant soil has as much as 20 percent coarse fragments in the subsoil.

Landtype phase 4 occupies the narrow flood plain of Angus Creek, extending 5 to 20 feet from the channel. The parent material of this unit is a mixture of alluvial materials. Depth to hard bedrock ranges from 4 to 20 feet. The dominant soil has a sandy loam to loam thin surface horizon over very dark brown to black clay loam and clay subhorizons. The soil is very poorly drained because of its fine texture.

Landtype phase 5 occupies the west-facing colluvial toeslopes adjacent to Angus Creek. Incised drainages range from 4 to 8 feet deep. Depth to hard bedrock averages from 10 to 20 feet. The dominant soil has a thick, very dark brown loamy surface horizon over a dark brown clay loam subsoil.

Landtype phase 6 occupies the steep north- and east-facing sideslopes of Wooley Ridge. The landtype is benchy and appears to contain ancient small slump areas. The dominant soils have a thick, very dark brown loam surface horizon over a light brown clay loam subsoil. This soil is moderately thick and contains weathered sandstone from about 25 inches on down. The subsoil contains 40 percent or more coarse fragments throughout. Depth to hard bedrock ranges from 1 to 4 feet.

Landtype phase 7 occupies 5 acres on east aspects of the main ridge top of the Wooley Valley Ridge. The dominant shape of the unit is rounded and concave. Dissection spacings range from 200 to 500 feet. Altitude ranges from 7,800 to 8,100 feet. The dominant soils are deep, have dark-colored silt loam to loam surfaces over a silt loam subsoil. Depth to bedrock ranges from 2 to 4 feet. The minor soils are shallow, have a stony loam surface over a very stony loam subsoil. Depth to hard bedrock ranges from 10 to 20 inches in depth.

Landtype phase 8 occurs near the upper third of the east side slope of Wooley Ridge. Runoff is scant. Most precipitation infiltrates and seeps from the lower end of the formation. The soils are moderately thick and have moderately thick, very dark brown loam surface horizons over stony clay loam and clay loam subsoil. The dominant soil has a loam surface horizon over a clay loam subsoil. The minor soil has a dark brown loam surface horizon over a very stony loam subsoil. Depth to hard bedrock ranges from 6 to 10 feet.

Landtype phase 9 occupies a toeslope near the east exit of Angus Creek into Rasmussen Valley. Depth to bedrock ranges from 8 to 12 feet. The dominant soil has a very dark brown loam surface over a clay subsoil. The minor soil has a very dark brown clay loam surface over a clay subsoil.

Landtype phase 10 occupies steep north- and east-facing convex slopes. This landtype phase contains small benches, with many seeps or small intermittent springs. Depth to hard bedrock is 6 to 8 feet. The dominant soil has a very dark brown loam surface horizon over a fine sandy clay loam subsoil, which overlies a very stony loam subhorizon. The subhorizon below the subsoil contains more than 35 percent coarse fragments.

Landtype phase 11 occupies the gently sloping, slightly convex bench above the toeslopes on the east-facing slopes of Wooley Ridge. The dominant soil occupies 50 percent of the area and has a very thick, very dark brown loamy surface horizon over a dark brown clay loam subsoil. Another soil has a dark brown loam surface over a brown, very stony loam subhorizon. It occupies 25 percent of the area. The remaining 25 percent is covered by a soil with a dark brown loam over a clay subsoil.

Land phase 12 occupies the steeper, slightly benchy slopes above landtype phase 11. Depth to hard bedrock ranges from 2 to 4 feet. The dominant soil has very dark brown, stony loam surface horizons over dark brown, very stony loam subhorizons.

Landtype phase 13 occupies 30 acres on moderately steep sideslopes of the Wooley Valley east-facing ridge. It occurs immediately below the top of the main ridges. The dominant slope lengths are 500 to 600 feet and have a convex shape. Elevations range from 7,200 to 7,600 feet. The soils have a thick, dark brown loam surface horizon over a brown clay subsoil. The substratum consists of a sandy clay loam mixed with weathered sandstone that ranges in thickness from 2 to 4 feet.

Landtype phase 14 occupies moderately steep, west-facing sideslopes. Depth to hard bedrock ranges from 3 to 5 feet. The dominant soil has a moderately thick, very dark brown loam or stony loam surface horizon over a very stony and (or) rocky loam subsurface horizon.

Landtype phase 16 occupies the steep to very steep west-facing slopes of Wooley Ridge and the ridge between Angus Creek and Rasmussen Valley. Depth to hard bedrock ranges from a few inches to about 2 feet. The dominant soil has a very dark brown, thin loamy surface horizon over a dark brown very stony subhorizon. Coarse fragments throughout the profile range from 35 to 65 percent.

3. WATER RESOURCES

a. Water Supply

1. Surface Water

More than 1 mile of Angus Creek passes within one-fourth mile of the Wooley Valley pit. The pits and dumps lie along 10,200 feet of the east slope of Wooley Ridge, intercepting many drainage channels. Snowdrifts accumulate above the mine, and an annual water yield of about 600 acre-feet could be expected off the slope above the pit. No data are available regarding how much of the yield would infiltrate; runoff here is relatively high. Some tributary streams draining the east slope of Wooley Ridge were flowing on June 5, 1975. A flow of 27 cfs per square mile of drainage area has been recorded on Angus Creek near the mouth. Hydrologic data indicate that the smaller streams in the mine area may flow at rates considerably higher than this.

2. Ground Water

Most of the area around the proposed mine is probably drained of ground water; however, drill-hole data at this site indicate that parts of the Phosphoria Formation are water-saturated. Fractures in the Rex Chert Member probably contain water in the areas near Angus Creek. The Dinwoody Formation, over which the creek flows for most of its length, is probably also saturated at levels below the creek level. The Grandeur Tongue of the Park City Formation, which will form the high wall of the pit in this area, probably contains water in places along the proposed pit site. The general ground-water gradient in this area is toward Angus Creek, but may be toward the headwaters of Enoch Valley in the northern part.

b. Water Quality

Water-quality data are available for 2 sites on Angus Creek: near the proposed Wooley Valley mine, and about 3 miles downstream from the site at the upper end of Rasmussen Valley. These data have been collected by the Forest Service. A summary for selected parameters is shown below for base-flow conditions (August 20, 1974, to October 10, 1974) just below the proposed mine, and August 19, to October 30, 1974, in upper Rasmussen Valley.

	Angus Creek, just above Unit 3		Angus Creek, 1 mile below Unit 3	
	Range	Average	Range	Average
Total Kjeldahl Nitrogen as N (ppm)	2.5-5.1	3.8	0.9-3.8	1.8
Total phosphorus as P (ppm)	0.01-0.04	.02	0.06-0.10	.07
Suspended sediment (ppm)	0-25	11	0-11	3.4
Turbidity (J.T.U.)	1.3-6.5	3.6	0.9-3.0	1.8
Specific conductance (micromhos at 25°C)	232-439	364	297-333	322
Dissolved solids (ppm)	160-303	252	205-230	223
Discharge (cfs)	*	*	1.2-3.5	1.9
Number of measurements	8	--	11	--

* too small to measure

The same parameters were determined for samples taken from the same sites on Angus Creek during the spring and early summer of 1975. This sampled water included snowmelt. Sediment concentration in Angus Creek just above Unit 3 ranged from 0 to 82 ppm in 24 measurements from March 18 to July 8, 1975. Other properties were similar to those in the fall of 1974.

Concentrations of selected trace elements were determined for two samples collected from each site on Angus Creek. These are "total" values determined on unfiltered and acidified samples.

	Just above Unit 3		1 mile below Unit 3	
	8-27-74	5-12-75	8-27-74	5-12-75
	(micrograms per litre)			
Arsenic	0 [1]	0	0	0
Cadmium	0	0	0	0
Chromium	9	10	4	2
Copper	6	6	8	5
Selenium	0	0	0	0
Vanadium	0	21	0	26
Zinc	3	18	3	20

[1] Concentrations reported as 0 are less than detectable amounts.

The values for vanadium in the 1975 samples, although not hazardous, are interesting in that mobility of that element is suggested.

4. AIR RESOURCES

Air quality near the proposed Wooley Valley mine is good, but some particulates enter the air from present mining adjacent to the site. No quantitative data are available, but estimates of 0.5 lb. per ton have been made. The amounts are greatest during hot, dry summers, under moderate wind conditions.

5. VEGETATION

Conifer-aspen covers about 600 acres, sagebrush-grass 175 acres. Forage production ranges from 600 to 1,800 pounds per acre air dry weight. Timber is uneconomical to harvest.

No rare or endangered plants are known on the site.

6. WILDLIFE

As many as 47 species of birds, 24 species of mammals, and 7 species of reptiles have been identified at the site.

Deer, elk, and moose inhabit the area. Snow depths force deer to leave, but moose and a small herd of elk winter near the mine area. As many as 30 deer, 40 elk, and 5 moose utilize the area. During winters of light snow, elk forage the southern slopes of Wooley Valley ridge. Suitable winter habitat is present for perhaps 50 elk.

The conifer and aspen support high populations of blue grouse and squirrels, as well as numerous other small animals and birds. Significant raptor populations are present and depend on the wide variety of prey. Nesting areas are near the minesite.

Angus Creek, above the Blackfoot Narrows, supports three colonies of beaver. Blue grouse nest on the sagebrush-grass slopes. Sandhill cranes are common except in winter, and suitable whooping crane habitat is present.

Peregrine falcons have been observed in the general area, but no threatened or endangered species have been observed on the site.

7. FISHERIES

The minesite does not support a fishery, but it drains into Angus Creek, which contains cutthroat trout, sucker, dace, redside shiner, and sculpin. From the lower end of the Angus Narrows upstream to within about 800 yards of its headwaters, cutthroat trout dominate. From the Angus Narrows downstream, dace, redside shiner, and sculpin dominate. Angus Creek is important as a feeder of migrant cutthroat trout to the Blackfoot systems. The Stauffer Mining Company has recently constructed a small sediment pond near the headwaters of Angus Creek that has been stocked with cutthroat trout. Trout survival and growth has been excellent; they average about 12 inches at 2 years.

Oil from past mining operations and accelerated sedimentation have affected the headwaters of Angus Creek. The stream is also being degraded from livestock grazing.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Agricultural tracts lie 1.5 miles northeast of the site at the upper end of Enoch Valley; they comprise approximately 1,280 acres of dry-land small grains and 2,560 acres of meadow grassland.

From July 21 to August 31, 1,000 sheep are permitted on an allotment in national-forest lands that include the Wooley Valley site. Each year they consume about 1,051 sheep-months of feed, valued at about $1,640. The national-forest lands on the leasehold are used in conjunction with the ranchers' private and leased land, and constitute a significant part of the grazing land. The leaseholds make up about 8 percent of the allotment.

2. SOCIOECONOMIC DEVELOPMENT

The proposed mining at Wooley Valley is a continuation of an ongoing mining operation employing about 75 people.

3. TRANSPORTATION AND UTILITIES SYSTEMS

Approximately one and one-half miles of the Little Long Valley Road lies within the Wooley Valley lease boundaries. The road is single-lane and unsurfaced and provides limited recreationist, stockman and forest products user access. Some primitive roads have been constructed off the Little Long Valley road in conjunction with exploration drilling operations.

No utility systems are on the site.

4. RECREATION RESOURCES

The proximity of the Wooley Valley site to the Enoch Valley and Blackfoot River roads makes it popular for recreation. Driving for pleasure and all-terrain vehicles are important parts of the area's recreation use, along with deer, elk, and bird hunting and horseback riding. Angus Creek provides excellent fishing.

No facility has been developed exclusively for recreation, but occasionally, crude hunting and fishing camps have developed. The proposed site can be used for recreation year-round; however, fall is the busiest season because of the colors, hunting and the need for firewood. Recreation visiting to the proposed site is moderate to low; hunters, fishermen, and snowmobilers are the most common. Visits normally last less than 2 days.

Numerous roads for mineral exploration have been built, but winter access is normally limited to snowmobiles. The Wooley Range conceals the site and lends an air of seclusion, even though it is readily accessible.

5 ARCHEOLOGIC AND HISTORIC VALUES

Subsequent to the Draft statement a cultural inventory was made by Forest Service Archeologist Evan Deblois. No artifacts were recovered, nor was there any evidence of prehistoric cultures. No historic sites are recognized on the leasehold. An archeologic clearance was recommended by Richard L. Harris, Director, Recreation Lands and Minerals, U. S. Forest Service.

6. AESTHETICS

The variety class for the area is rated moderate. Most of the proposed mine area is within one-half mile of existing roads but is hidden from the Blackfoot River Road. Part of the attraction to the area is the physical separation created by the surrounding ridges, which provide seclusion. Aesthetic values are enhanced by the undeveloped nature of the area, and visual conflicts are minimal. Landscape disturbances are largely contained in the road corridors leaving a basically natural, unmodified landscape.

CHAPTER III
ENVIRONMENTAL IMPACTS

The impacts described below are based upon mining as originally proposed. The impacts at a lower, more probable level of mining, as shown in table 1-1a, will be the same.

A. NATURAL ENVIRONMENT

1. LAND RESOURCES

a. Land Surface

Mining will create 129 acres of pit and 85 acres of dumps. Surface facilities will modify 101 acres. The pit will be 10,200 feet long, 480 to 660 feet wide, and 160 to 370 feet deep. Waste rock will total 15 million cubic yards. Dumps will be smooth and will have a low profile.

b. Geology and Mineral Resources

Mining will remove 5 million short tons of phosphate rock, which will include 120,000 short tons of fluorine, 550 short tons of uranium, 4,000 short tons of vanadium, and 5,000 short tons of rare earths. Only phosphate will be recovered from the ore.

c. Soils

Mining will disturb soils on 315 acres, at a rate of about 110 acres per year.

2. WATER RESOURCES

a. Water Supply

1. Surface Water

Mining and related activities will reduce infiltration and increase surface runoff, erosion, and sedimentation.

2. Ground Water

The bottom of the proposed pit will be below the level of Angus Creek, so water may seep into the pit. This seepage may reduce the flow in the reach along the pit; however, if the cleared drainage water is reintroduced into the creek, discharge downstream from the pit should not change significantly. Draining perched water bodies may dissipate soil moisture that now sustains vegetation.

b. Water Quality

Limited data collected to date indicate that limited ongoing mining near the site and the mitigating measures employed have resulted in low increases in sediment and dissolved solid concentrations. The proposed operation probably will have similar low impacts.

3. AIR RESOURCES

The proposed Wooley Valley mine will have no additional impact on air quality. The proposed mining is a continuation of ongoing mining, which creates about 0.5 pounds of particulates per ton of ore.

4. VEGETATION

The proposed Wooley Valley mine will progressively remove vegetation from about 315 acres, of which about 205 acres are conifer-aspen and 110 acres are sagebrush-grass.

5. WILDLIFE

At the Wooley Valley site, elk migration routes will be blocked, and winter range will be lost. As many as 30 deer, 40 elk, and 5 moose may be lost. Squirrels, blue grouse, and numerous other species will be displaced when timber is removed. As many as 100 blue grouse may be lost.

Impact upon the 3.3 miles of beaver habitat will depend upon the extent the willow and other riparian vegetation is altered.

Suitable sandhill crane and whooping crane habitat will be altered in the headwaters of Angus Creek during the mining phase.

6. FISHERIES

Mining near the proposed Wooley Valley mine has already degraded some headwater areas, and further mining will further lower the quality of fisheries in the Angus Creek Narrows.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Mining will progressively remove forage from 315 acres of rangeland with an estimated average annual production of about 350 pounds of usable forage per acre, air dry weight. During the life of the mine, as many as 550 sheep months, valued at $860 annually, will be lost on at least part of the site; some additional forage may be lost on adjacent lands.

2. SOCIOECONOMIC DEVELOPMENT

The proposed mine will employ about 60 people when fully operational. The social and economic impacts at the site will be minimal and, by themselves, not significant, but the cumulative effect of this and other mining proposals will significantly impact the regional socioeconomics, as described in Part 1.

3. TRANSPORTATION AND UTILITIES SYSTEMS

Mining will block access to the head of Angus Creek. The existing low-standard road in Little Long Valley will be closed and sections will be obliterated as mining proceeds. Mine roads will provide good access into Little Long Valley when mining is completed.

4. RECREATION RESOURCES

The proposed Wooley Valley mine will reduce big-game and bird hunting opportunities, as well as fishing opportunities in Angus Creek. Dispersed camping, picnicking, ORV use, and driving for pleasure will also be adversely impacted to a minor degree, inasmuch as this is a continuation of present mining.

5. ARCHEOLOGIC AND HISTORIC VALUES

No known sites will be impacted.

6. AESTHETICS

The proposed Wooley Valley mine is in the foreground viewing zone of the Angus Creek road. Although the Wooley Range conceals most of the proposed minesite from the Enoch Valley and the Blackfoot River roads, haul roads and utility corridors will be in the foreground; accordingly, their aesthetic impacts will be moderate to high.

CHAPTER IV
MITIGATING MEASURES

This chapter discusses mitigating measures that apply to both the Wooley Valley and Rasmussen Ridge proposals; in addition it discusses measures that apply specifically to the Wooley Valley site.

State and Federal laws, regulations, and administrative policies that require mitigation or reclamation of mining impacts, and requirements of the surface-management agencies and the USGS District Mining Supervisor are discussed in detail in Part 1, Chapter IV. These shall be required at these sites. Other possible mitigating measures as discussed in Part 1, Chapter IV, shall also be required as appropriate.

The following proposals for mitigating impacts are taken directly from Stauffer's mining plans for the two minesites.

Stauffer proposes partial backfilling of the pits at both sites. Backfilling will reduce the size of the dumps, as will the use of waste rock in constructing haul roads. Dumps will be graded and shaped to blend with the surrounding topography.

At both sites, Stauffer plans land treatment that will minimize loss of topsoil and productivity; disruption of physical, chemical, and biological properties of soil; soil loss by wind and water erosion; and compaction. Mitigating measures will include stockpiling topsoil for replacement on disturbed areas, and use of mechanized equipment, such as scrapers, to minimize soil mixing. Ripping and cultivating the soil before seeding will minimize compaction, as will restricting unnecessary off-road vehicle use by equipment operation and employees. Seeding will be done with cyclone seeders after scarification. Soil erosion will be minimized by revegetation; water-erosion structures, including water bars, terraces, contour furrows, grassed waterways, and interceptor ditches will divert running water away from unprotected disturbed areas; and partial backfilling will reduce the area of pits and dumps.

Access for fire control will be improved by the haul roads from the railroad-loading facility to the proposed minesites, which will improve access to Angus Creek Narrows and Sheep Creek. The Forest Service will be complemented with men and equipment for control of fire. Detection of fire should be improved because mining personnel will be in the area throughout most of the day and week.

Stauffer has proposed the following specific measures for the Wooley Valley site.

The proposed dump will be constructed in 50-foot vertical lifts, with a downstream face of about 3:1 slope. Benches will be constructed to carry water to either end, draining into natural terrain. The outer part of the bench will be sloped toward the outer face. Upon completion of mining, the dump will be covered with topsoil, scarified, and seeded. The top surface will be sloped to retain runoff in collection areas behind the dump. Brush barriers will be constructed, where feasible, to reduce water velocity and to serve as silt-retention and deposition devices. The haul road will be a fill that will create an elongated dike between the mining zone and Angus Creek which will act as a substantial buffer zone. Runoff above the road will be directed into a ditch that drains into silt-retention ponds. The water from these ponds then would pass through the road in culverts raised above ground level, discharging into rock baffles before flowing into Angus Creek. The road surface will be sloped to direct runoff into the ditch system above the road. Drilling sites and roads will be smoothed and reseeded. The company plans to control dust at the minesite by watering.

One further site-specific mitigating measure should be required at the Wooley Valley site: constructing one more in-stream sediment-catchment basin to further safeguard downstream fisheries. Ongoing studies of fisheries throughout the Angus Creek drainage will monitor the success of mitigating measures.

CHAPTER V
ADVERSE EFFECTS THAT CANNOT BE AVOIDED

Changes in the land surface are unavoidable (fig. 11-4); 135 acres will not be reclaimed. Mining will create 129 acres of pits and 85 acres of dumps. Backfilling will reduce these areas. Soils will be disturbed on 315 acres.

The pit will breach aquifers and lower local ground-water levels. This could locally decrease soil moisture, which now supports vegetation. Seasonal runoff may carry sediment to Angus Creek, increasing its turbidity. If mitigating measures prove ineffective, impacts may be moderate to high.

Mining will ultimately remove vegetation from 315 acres, with about 120 to 170 acres cleared at any one time during the life of the mine. Annual forage production on 180 acres of reclaimed land will probably not exceed 300 to 900 pounds per acre, air dry weight--about half the present value. Production on 135 acres of unreclaimed roads, pits, and water-control structures will be lost.

As many as 40 elk, 30 deer, and 5 moose, as well as other large animals, will be lost. Winter range for as many as 50 elk will be destroyed. Breeding, nesting, and brood-rearing habitat for as many as 100 forest grouse will unavoidably be altered during mining. Displacement of sandhill cranes through alteration of habitat cannot be avoided Habitat suitable for whooping cranes will also be altered.

The proposed mine will reduce the quality of the fisheries in Angus Creek. Fish populations will decline, and the migrations of cutthroat trout could be adversely affected.

Mining will ultimately remove forage from 315 acres of rangeland. Average annual production of usable forage on about 180 acres of reclaimed land will probably not exceed 200 pounds per acre, air dry weight; forage on 135 unreclaimed acres will be almost totally lost.

The mine will lend to the visual deterioration from past mining. The site is high on a ridge and thus will be visible for miles.

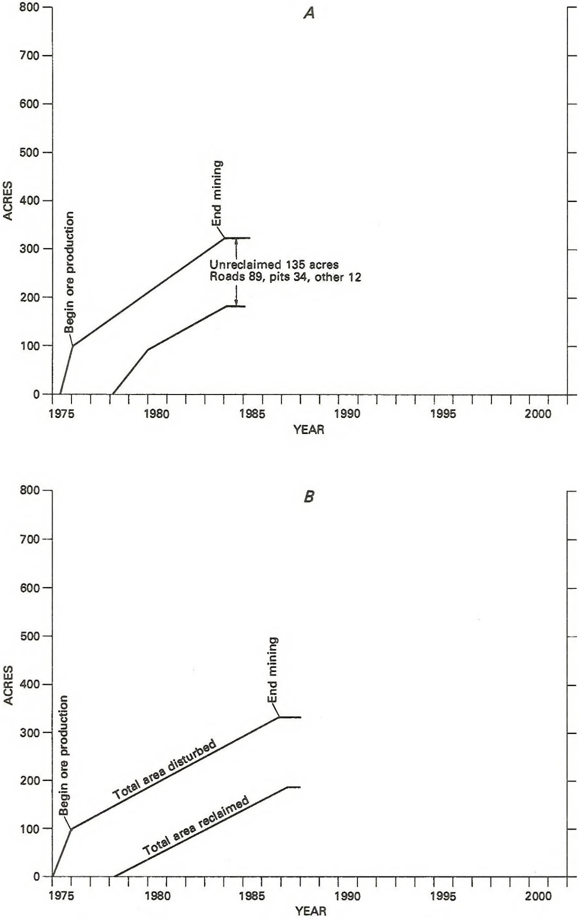

Figure 11–4.—Land disturbance and reclamation, Wooley Valley Unit 3 site. *A*, Based on mining plan as submitted for approval. *B*, Based on revised level of mining.

CHAPTER VI
SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

At either level of mining, about 5 million tons of phosphate rock will be removed from the site and transported to Montana and Wyoming for processing into fertilizer. During mining, soils will be disturbed on 315 acres, and 15 million cubic yards of overburden and bedrock will be moved.

Dewatering the pit during mining will lower ground-water levels near the mine and increase surface flows and decrease water quality in Angus Creek. There will be local short-term lowering of air quality from dust and vehicle emissions.

During mining, vegetation will be progressively removed from 315 acres; forage production of 600 to 1,800 pounds per acre, air dry weight, will be lost on about 120 to 170 acres at any given time. Wildlife populations will be disrupted. As many as 40 elk, 30 deer, and 5 moose will be displaced to adjacent ranges. Prey areas for raptors will be reduced. Angus Creek will be affected with consequent impact on the fisheries. Annual forage production on 180 acres of reclaimed land will probably not exceed 300 to 900 pounds per acre, air dry weight--about half the present value. Production on 135 unreclaimed acres will be lost. The aesthetics of the area and its recreation resources will be reduced by the mining.

Long-term productivity of the area will be decreased. Although most of the pit will be backfilled, vegetation on the disturbed soils will probably not recover to pre-mining levels. On the minesite, as many as 550 sheep months of forage, valued at $860 annually, will be lost during mining, because at least part of the site will not be available for grazing. Some long-term reduction in game herds--especially elk, deer, and moose--will result from competition on nearby ranges from the displaced animals. Average annual production of usable forage on 180 reclaimed acres will probably not exceed 200 pounds per acre, air dry weight. Production on 175 unreclaimed acres will be virtually zero. On the entire site, average production of usable forage of about 390 sheep months, valued at $610, will be lost annually. The original condition of the land and its aesthetic resources will not be fully renewable after operations. The mining will have long-term effect upon the aesthetic character of the area by conflicting with the natural remoteness and contrasting with natural scenery of the area.

CHAPTER VII
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

At either level of mining, about 5 million tons of phosphate rock will be mined and processed by Stauffer. This is irretrievable. This ore contains 120,000 short tons of fluorine, 4,000 short tons of vanadium, 550 short tons of uranium, and 5,000 short tons of rare earths, which will be removed but not recovered. The landscape change through creation of dumps and pits is largely irreversible. The mixing of soils and attendant reduction of productivity on 315 acres is irreversible. Loss of wildlife, to the extent that it cannot successfully relocate, is also irretrievable. The remote, undeveloped character of the area will be irreversibly and irretrievably committed to further intrusion of mining-related changes.

Mining and reclamation will require 2.5 million gallons of diesel fuel, 200,000 gallons of gasoline, and an unknown amount of lubricants, explosives, and electricity.

Assuming that a third of the ore is shipped to Silver Bow, Montana, for processing into elemental phosphorus, about 1.7 billion kilowatt-hours of electricity, 7,000 gallons of gasoline, 200,000 tons of coke, 260,000 tons of silica, and 5,000 tons of carbon electrodes will be required. Rail transportation of the ore to Montana will require 3.9 million gallons of diesel fuel.

Beneficiating the remaining ore at Leefe, Wyoming will require 26 million kilowatt-hours of electricity, 13,000 gallons of gasoline, and 16 billion cubic feet of natural gas. Processing the beneficiated rock into fertilizer will require about 190 million kilowatt-hours of electricity, 13,000 gallons of gasoline, and 3 million tons of sulfuric acid.

CHAPTER VIII
ALTERNATIVES

This chapter discusses alternatives that apply specifically to the Wooley Valley proposal.

The general administrative options available to the Secretary of the Interior are discussed in Part 1. Rejection of the Wooley Valley proposal would limit immediate impacts to the adjoining area of current mining or lead to earlier mining at Rasmussen Ridge, thereby transferring impacts to that site.

The following are alternatives to the Wooley Valley mining plan.

Stauffer proposes partial backfilling. The alternative of replacing all the waste would probably eliminate the dumps and nearly fill the pits. Stauffer proposes to use scrapers to haul ore from the pit to the existing conveyor for transfer to railroad cars, which haul the ore from the area. Other alternatives would probably have greater impact.

PART 11.2
RASMUSSEN RIDGE MINING PLAN

CHAPTER I
DESCRIPTION OF THE PROPOSED ACTION

The proposed mine is along the crest and east slope of Rasmussen Ridge about 18 miles northeast of Soda Springs (fig. 11-5). The property involves Federal phosphate leases I-04375 and I-07619. Adjacent use-permit land would be required for haul and access roads and a conveyor system. This need is not discussed in the plan, and company officials indicate that offsite requirements need to be defined.

Lease I-04375 has 800 acres, all within the Caribou National Forest. Lease I-07619 has 240 acres with private surface ownership and 120 acres Forest Service ownership.

The plan does not discuss past mining but it does mention several trenches along the outcrop. There has been no production under either lease.

Except for two shallow trenches, referred to in the plan, there has been no subsurface exploration on the leasehold. The mining plan, as submitted, is conceptual and does not contain sufficient engineering details for final consideration of approval or disapproval under Federal Regulation 30 CFR 231. The following details are lacking at this time and will be required.

1. The idealized cross sections, exhibited in the plan, need to be supported by drill hole exploration and the drillhole logs and analysis of phosphate zones furnished to the USGS.

2. The character of the phosphate beds that will be left unmined in the pit bottoms is not identified.

3. Engineering designs for drainage culverts and erosion control interceptor ditches and berms are lacking.

The following is taken from the mining plan prepared by Stauffer Chemical Company and submitted to the Conservation Division, U.S. Geological Survey on December 31, 1974, in accordance with Federal Regulation 30 CFR 231.10, and from interviews with company representatives.

A. PROPOSED MINING OPERATIONS

Stauffer estimates that a minimum of 16 million tons of ore will be extracted from the proposed mine at a rate of approximately 1.2 million tons per year. The ore occurs in two phosphatic beds separated by a low-grade phosphatic waste shale. The dip of the beds dictates the extraction of the upper ore zone before the lower ore can be extracted.

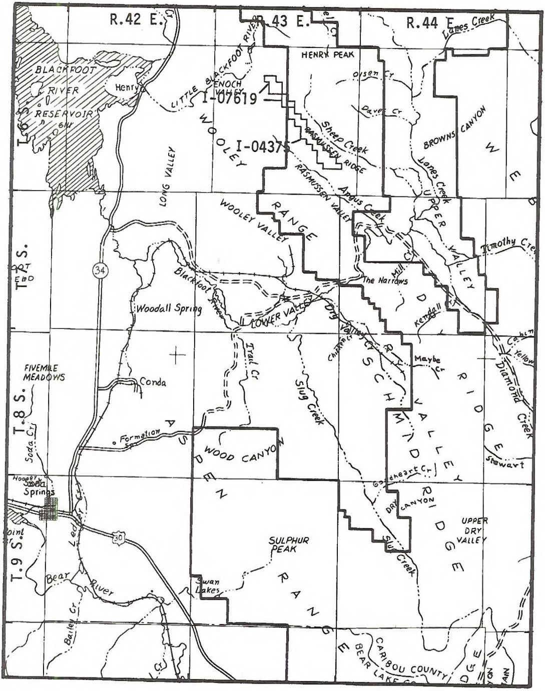

Figure 11-5.--Location of Federal phosphate leases for the proposed Rasmussen Ridge mine.

Mining will be done by conventional open-pit methods (fig. 11-6), with 90 percent of the waste rock used for backfilling already-mined areas. The plan does not discuss the character of the ore that will be left unmined in the pit bottoms--that is, whether the ore is altered and therefore amenable to present extractive chemical-plant processing. The company states that backfilling virtually eliminates future extraction downdip. The plan does not provide for marginal-ore stockpiling nor does it state the minimum grade P_2O_5 to be mined and processed. (The company states that the upper ore bed averages about 29 percent P_2O_5; the lower bed, about 26 percent. A blend of ore at 27 percent will be shipped.)

The plan discusses the preparation of the site before mining, removal of overburden and utilization of that material, mining and delivery of the ore to the conveyor-feed storage pile, and reclamation of disturbed areas. It does not discuss the feasibility of underground mining below the depth of stripping. The ore will be mined in three stages, from 5 pits divided into 11 panels (fig. 11-7). Stage 1 covers panels 1 through 5; stage 2, panels 6 through 9, and stage 3, panels 10 and 11.

Mining will be done by open-pit method, beginning at the south end of the ore deposit. Waste from the first panel will be used for haul-road construction on the east side of the pits. The remaining waste will be piled at the prepared dump site just east of the first panel pit and haul road. Waste from the second panel will be used for haul-road construction and for backfill in panel 1. This sequence of mining and backfilling will continue until panel 11 is mined; panel 11 will not be backfilled, and panels 5 and 10 will be only partially backfilled. The mining plan indicates that about 90 percent of the waste rock will be used for backfill material.

Mining will utilize dozers and scrapers for both stripping and ore extraction. Drilling and blasting may be needed to loosen blocky zones of chert overburden. Scrapers will be used for removing the ore from the mining panels and dumping the ore at the 10,000-ton surge pile. The plan states the ore will be moved by conveyor to a truck-loading hopper in Rasmussen Valley. From there, trucks will haul the ore 4 miles to a stockpile at Stauffer's Wooley Valley mine. From that stockpile, the ore will be moved by conveyor belt and loaded into rail cars. Alternate rail transportation, replacing the haul road to Wooley Valley is being considered.

Topsoil will be removed by scrapers, before disturbing the area and stockpiled for revegetation use.

The total disturbed area of 321 acres consists of 191 acres for pits, 29 acres for dumps, 24 acres for roads, and 27 acres for other facilities.

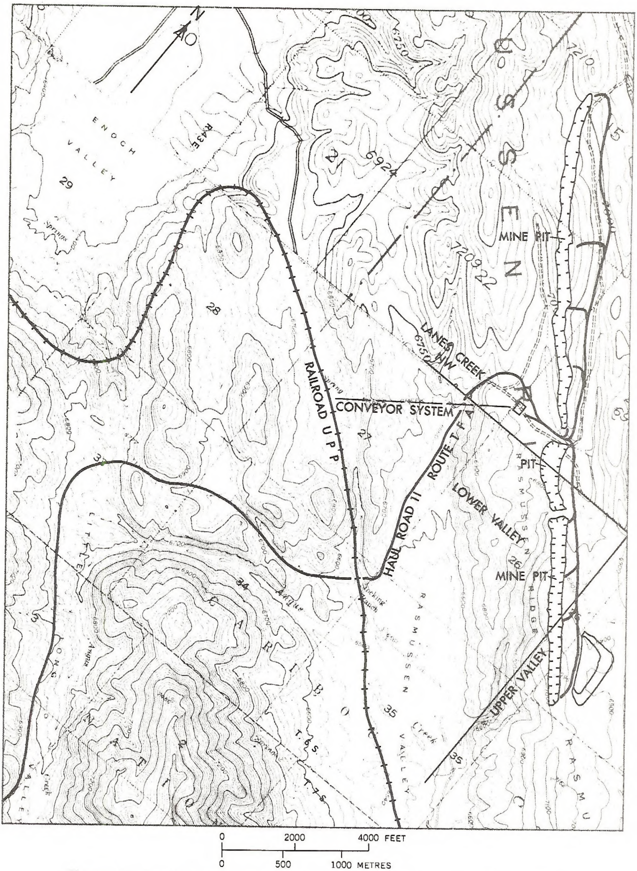

Figure 11-6.--Mining plan proposed for the Rasmussen Ridge site.

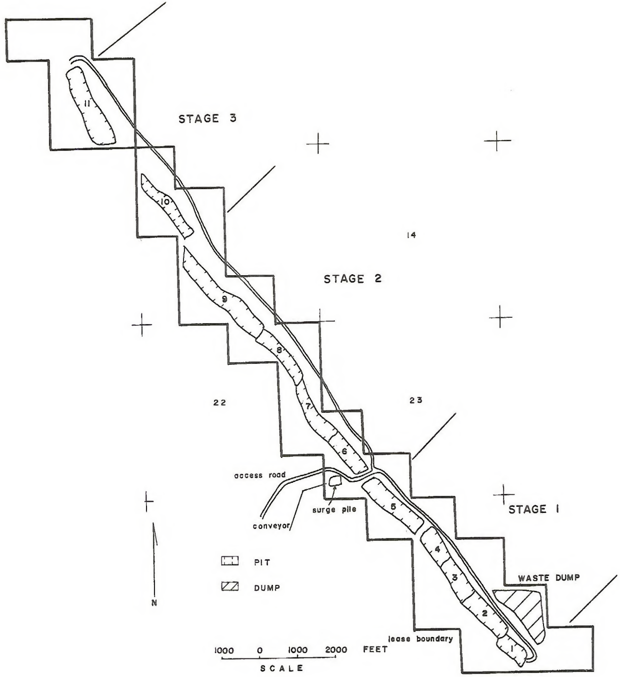

Figure 11-7.--Mining sequence proposed for the Rasmussen Ridge mine.

Pit dimensions, in feet, and acreages are as follows:

Stage	Pit length	Pit width	Pits	Top-soil	Waste dump	Roads	Surge pile
1	7,540	450	78.62	8.2	28.88	27.91	0.52
2	8,000	400	71.02	5.62	--	28.17	--
3	5,200	360	40.98	6.33	--	18.38	--
Total	20,740	[1]400	190.62	20.15	28.88	74.46	0.52

[1] Average.

B. RECLAMATION

Soil erosion will be minimized by retaining as much of the original vegetation as possible, preserving and maintaining present drainage wherever possible, saving topsoil from disturbed areas for revegetation, and seeding exposed areas, including road shoulders, back slopes, the waste dump, and backfilled mine pits. Reclamation will be started as each panel has been backfilled.

The seed mixture, approved by the Forest Service and successfully used at the Wooley Valley mine, will consist of smooth brome, intermediate wheat grass, pubescent wheat grass, and blue bunch grass, at 5 pounds per acre of each, and tall wheat grass, Russian wild rye, domestic rye or oats, range alfalfa, and yellow clover, at 3 pounds per acre of each.

Interceptor ditches or berms will be constructed above backslopes as necessary to deter erosion of cut slopes. Erosion-control gutters will convey concentrated runoff to drainage channels. Culverts and drains will be adequate for maximum anticipated runoff.

The waste dump will be graded at a slope not steeper than 2:1, to insure slope and soil stability. Much of the waste-dump, facing away from the mining area, will be sloped to 3:1, with 30-foot benches spaced 30 to 40 feet apart vertically. On the slope facing the mining area, the waste dump will be graded to 5:1. The top surface of the dump will be sloped to retain runoff in a collection area behind the dump.

Pit walls, on the high wall or hanging-wall side, will be sloped at 45° and benched as needed. Safety benches 15 to 20 feet wide will be placed on the pit walls at 50- to 100-foot vertical intervals. Pit walls, on the footwall side, will follow the ore contact until it steepens above 45°, then the wall will be sloped to 45° and benched.

Road cuts and fills will be sloped at not more than 2:1, and the surfaces will be reseeded at the proper time. Upon abandonment of the mine, roads will be closed and revegetated.

Dams along drainages will inhibit movement of silt and sediment. Contoured backfilled pits will direct drainage toward siltation-control channels. Brush barriers will be constructed, where needed, to reduce erosion.

C. SURFACE FACILITIES

Surface facilities will include an access road in Rasmussen Valley, a conveyor system to carry the ore from the mine to a loading facility in Rasmussen Valley, and a 4-mile haul road from the conveyor to the Wooley Valley mine. If a railroad is extended into Rasmussen Valley, the haul road will not be built. Additional facilities will be fuel-storage area, mine office, and a parking area for cars and trailers. All structures, except safety fencing, will be removed upon conclusion of mining. Electric power requirements and transmission facilities are not addressed. Raw ore will be shipped by rail to Stauffer's processing plants at Leefe, Wyoming, and Silver Bow, Montana.

CHAPTER II
DESCRIPTION OF THE EXISTING ENVIRONMENT

A. NATURAL ENVIRONMENT

1. CLIMATE

The general climate of the region is described in Part 1.

Average temperatures at the minesite are probably a few degrees lower than at Conda, and the growing season is shorter. Parts of the minesite are on northeast-facing slopes and thus are shaded from direct sunlight during much of the year. Annual precipitation averages about 22 inches. Snowfall exceeds that at Conda. Snowdrifting is probably common at the minesite. Based on data from nearby sites, more drifting probably occurs on the northern and eastern slopes than on the southern and western slopes.

2. LAND RESOURCES

a. Land Surface

Most of the proposed mine is on the east flank of Rasmussen Ridge. The highest altitude on Rasmussen Ridge is 7,823 feet, about 1,500 feet above the floor of Enoch Valley.

b. Geology and Mineral Resources

The Meade Peak strikes N. 20°-40° W. along Rasmussen Ridge, dips 30°-50° E., and is part of the east limb of the Snowdrift anticline, whose axis is west of the ridge crest. Here, the Meade Peak outcrop is disrupted mainly by small transverse faults, whereas much of the Meade Peak in the west limb of the anticline is cut out by the Enoch Valley fault.

The thickness of the Meade Peak ranges from 60 feet at the north end of the mine area to over 200 feet at the center. The total thickness of the lower and upper phosphate zones is 39 to 65 feet. The company plans to produce about 16 million short tons of phosphate rock. Estimates of some economically valuable elements that could be recovered from the phosphate ore are: 380,000 short tons of fluorine, 1,800 short tons of uranium, 13,000 short tons of vanadium, and 16,000 short tons of rare earths.

c. Soils

The distribution of landtypes is shown in figure 11-8; soil characteristics are given in table 11-2.

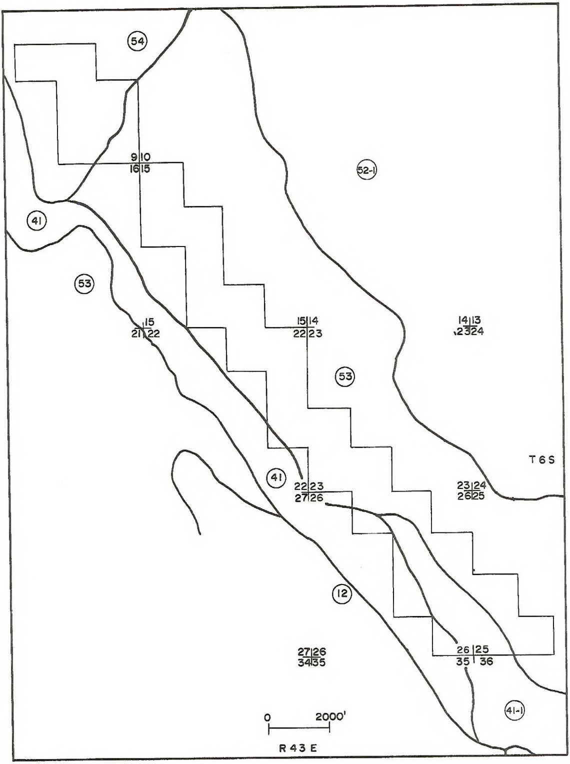

Figure 11-8.--Landtypes near the Rasmussen Ridge site.

Table 11-2.--Physical characteristics of soils at Rasmussen Ridge minesite. VL = very low, L = low, M = moderate, H = high, VH = very high

Land-type	Soil families	Percent of area	Erosion in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road Construction hazards	Slope range, in percent	Revegetation potential
				Depth in inches	Suitability					
41	Calcic Pachic Cryoborolls, loamy-skeletal, mixed	55	0.075	10	M	3.9	L	H	30-70	VL
	Argic Pachic Cryoborolls, loamy-skeletal, mixed	20	.032	10	H	5.7	L	H	20-50	L
	Lithic Cryoborolls, loamy-skeletal, mixed	15	.023	4	L	3.4	VL	M	20-30	VL
	Argic Cryoborolls, loamy-skeletal, mixed	10	.045	8	L	4.5	L	H	40-60	L
41-1	Calcic Cryoborolls, loamy-skeletal, mixed	75	.041	6	L	4.6	M	H	40-60	VL
	Lithic Cryoborolls, loamy-skeletal, mixed	15	.052	6	M	3.4	L	VH	20-30	VL
	Mollic Cryoboralfs, loamy-skeletal, mixed	5	.017	8	L	8.8	L	M	50-60	M
	Argic Pachic Cryoborolls, loamy-skeletal, mixed	5	.010	12	M	5.7	M	M	35-45	H

Table 11-2.--Physical characteristics of soils at Rasmussen Ridge minesite--Continued

Land-type	Soil families	Percent of area	Erosion in inches per year	Topsoil potential		Available water capacity	Mass failure hazard	Road Construction hazards	Slope range, in percent	Revegetation potential
				Depth, in inches	Suitability					
53	Cryic Paleoborolls, fine-loamy, mixed	25	0.007	10	H	7.4	M	M	25-45	VH
	Argic Cryoborolls, clayey-skeletal, montic	10	.005	8	L	6.2	M	M	30-50	H
	Pachic Cryoborolls, loamy-skeletal, mixed	45	.018	12	M	4.3	L	H	40-60	H
	Typic Cryorthents, loamy-skeletal, mixed	20	.007	6	M	5.2	L	M	40-50	M
54	Mollic Cryoboralfs, loamy-skeletal, mixed	45	.061	6	L	8.8	L	M	35-50	H
	Mollic Cryoboralfs, fine-loamy, mixed	30	.018	6	L	7.2	L	M	40-55	M
	Lithic Cryoborolls, loamy-skeletal, mixed	20	.012	4	M	3.4	VL	H	15-35	L
	Typic Cryorthents, loamy-skeletal, mixed	5	.004	0	L	5.2	M	H	30-50	M

The following landtypes and acreages occur on the leaseholds:

Landtype	Acreage
41	70
41-1	130
53	665
54	175

These landtypes are described in Part 5.1, Chapter II.

3. WATER RESOURCES

a. Water Supply

1. Surface Water

The Sheep Creek tributary becomes perennial a short distance below the proposed mine and dump. Surface drainage into this pit will be limited to the area of the pit. About 2/3 of the proposed mine area drains into a tributary of Angus Creek; about 1/3 is near and drains into a tributary of Sheep Creek.

The tributary of Angus Creek is perennial to a point where it crosses the Wells Formation, below which it is intermittent. No data are available regarding characteristics of streamflow in this creek and in the tributary to Sheep Creek.

2. Ground Water

Few data are available on ground water at the minesite. However, scattered bodies of perched water occur at other pit sites having similar geology, and a few small bodies of perched water probably occur on Rasmussen Ridge.

The proposed haul road will cross the tributary to Angus Creek. This tributary is probably underlain by thin saturated alluvium, which may be a source of local recharge to the Dinwoody, Phosphoria, and Wells Formations.

b. Water Quality

Sheep Creek flows within half a mile and parallel to the proposed Rasmussen Ridge pit. It is now relatively undisturbed. During a period of base flow (August 20, 1974 to October 30, 1974) 11 analyses of Sheep Creek water and measurements indicate the following:

Parameter	Range	Average
Total Kjeldahl nitrogen as N (ppm)	1.2-4.7	2.3
Total phosphorus as P (ppm)	0.01-0.06	.03
Suspended sediment (ppm)	0-5	1
Turbidity (J.T.U.)	0.6-1.3	.9
Specific conductance (micromohos at 25^{o}C)	329-761	381 (343)
Dissolved solids (ppm)	227-525	263 (236)
Discharge (cfs)	4.3-6.0	5.1
Number of measurements	11	--

One analysis showed much higher values for dissolved solids (525 ppm) and specific conductance (761 micromhos). These values are questionable, and were not used in the computation of averages shown in the table.

Analyses of 21 samples collected from March 17, to July 8, 1975, during the spring runoff period indicate a range of 1 to 167 ppm of suspended solids, with an average concentration of 32 ppm. Values for other parameters were similar to those of the earlier samples. The Forest Service is continuing monitoring this stream.

Two samples of Sheep Creek water were analyzed for concentrations of selected trace elements, known to exist in the Phosphoria Formation. These "total" values, in micrograms per litre, were obtained by analysis of unfiltered and acidified samples and hence may be higher than the concentrations in true solution. The values do, however, provide a measure of the mobility of the elements.

	August 26, 1974	May 14, 1975
Arsenic	0 [1/]	0
Cadmium	0	0
Chromium	10	1
Copper	5	4
Selenium	0	0
Vanadium	0	22
Zinc	2	14

[1/] Concentrations reported as 0 are less than detectable amounts.

4. AIR RESOURCES

Air quality near the minesite is good. Minor amounts of dust and other particulates result from traffic.

5. VEGETATION

On the Rasmussen Ridge site, conifer-aspen covers about 915 acres, and sagebrush-grass covers about 245 acres. Forage production ranges from 600 to 2,400 pounds per acre air dry weight. Timber is uneconomical to harvest.

No rare or endangered plants are known on the site.

6. WILDLIFE

Some 47 species of birds, 24 species of mammals, and 5 species of reptiles occur in the area. Deer, elk, and moose inhabit the area. Snow depths force deer to leave, but some moose and a small herd of elk winter near the mine area. As many as 25 elk may use the area. An elk-calving ground was identified on the leasehold in 1975.

The Rasmussen ridge area includes some of the better deer habitat; as many as 50 deer use the area. Deer and elk both migrate across the ridge.

Blue grouse nest in the sagebrush-grass habitat on the west- and south-facing slopes. A substantial population of ruffed grouse inhabits the north and east slopes of Rasmussen ridge, and sage grouse inhabit the south part of the ridge. A sage grouse strutting ground and nesting area has been identified on a hill side. In 1969, Hungarian partridge were observed in the same area as the grouse. It is not known if partridge still inhabit this area.

Raptors and turkey vultures are common.

Sandhill cranes are common in both areas except in winter, and suitable whooping crane habitat is present. Peregrine falcon are known to be in the area, and an active aerie is within the established hunting area from the minesite.

7. FISHERIES

The minesite does not support a fishery, but it drains into Angus Creek, which contains cutthroat trout, sucker, dace, redside shiner, and sculpin. From the lower end of the Angus Narrows upstream to within about 800 yards of its headwaters, cutthroat trout dominate. From the Angus Narrows downstream, dace, redside shiner, and sculpin dominate. Angus Creek is important as a feeder of migrant cutthroat trout to the Blackfoot systems. The Stauffer Mining Company has recently constructed a small sediment pond near the headwaters of Angus Creek that has been stocked with cutthroat trout. Trout survival and growth has been excellent; they average about 12 inches at 2 years.

Oil from past mining operations and accelerated sedimentation have affected the headwaters of Angus Creek. The stream is also being degraded from livestock grazing.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Agricultural tracts lie 2 miles west of the Rasmussen Ridge site, at the upper end of Enoch Valley. The tracts comprise approximately 1,280 acres of dry-land small grains and 2,560 acres of meadow grassland.

From July 1 to September 5, 1,100 sheep are permitted on national-forest lands that include the Rasmussen Ridge site. From June 11 to September 30, 361 cattle are permitted. Each year the sheep consume about 2,475 sheep-months of forage, valued at $3,860, and the cattle consume about 993 AUM's valued at about $5,850. The national-forest lands that include the leaseholds are used in conjunction with the ranchers' private and leased land, and constitute a significant part of the grazing operations. The leaseholds make up about 5 percent of the total allotment.

2. SOCIOECONOMIC DEVELOPMENT

The minesite is used mainly for grazing.

3. TRANSPORTATION AND UTILITIES SYSTEMS

With the exception of primitive access roads, the site has no transportation or utilities systems.

4. RECREATION RESOURCES

The ridgetop location of the site is popular for hiking, horseback riding, and hunting. Deer, elk, and game birds inhabit the area and attract many sportsmen and nature enthusiasts.

No recreation facilities, as such, have been developed. Recreation uses have conformed to the utility roads and natural terrain. Visitors to the proposed site have been few, with hunters being the most common. Recreation visitors normally stay less than a day. Hunting and collecting forest products in the fall attract most visitors. Heavy snow normally restricts recreation uses to late spring, summer, and fall.

Snowmobiles are limited to ridgecrests and developed roads because of the steep slopes elsewhere. Travel to the site still requires considerable effort.

5. ARCHEOLOGIC AND HISTORIC VALUES

There are no known archeologic or historic sites on the site. However, no systematic survey has been done.

6. AESTHETICS

The variety class for the Rasmussen area is rated moderate to low. The site is within the middleground viewing zone of secondary travel routes and use areas. Landscape disturbances are largely contained in the road corridors leaving a basically natural, unmodified landscape.

CHAPTER III
ENVIRONMENTAL IMPACTS

The impacts described below are based upon mining as originally proposed. The impacts at a lower, more probable level of mining, as shown in table 1-1a, will be the same.

A. NATURAL ENVIRONMENT

1. LAND RESOURCES

a. Land Surface

Mining on Rasmussen Ridge will create 191 acres of pit and 29 acres of dump. Roads, buildings, and other facilities will modify 101 acres. The pit will be 20,740 feet long, as wide as 450 feet, and as deep as 500 feet. Waste rock will total 30 million cubic yards. Dumps will be smoothed and will have a low profile.

b. Geology and Mineral Resources

Mining will remove 16 million short tons of phosphate rock, which will include 380,000 short tons of fluorine, 1,800 short tons of uranium, 13,000 short tons of vanadium, and 16,000 short tons of rare earths. Only phosphate will be recovered from the ore.

c. Soils

Mining will disturb soils on 321 acres. About 1/4 of the disturbance is for access roads that will have a moderate, long-term impact.

2. WATER RESOURCES

a. Water Supply

1. Surface Water

Buffer zones between haul road, dump, and stream channels are narrow, and runoff and sediment may move across them. Increased runoff could increase sedimentation of Angus and Sheep Creeks and the Blackfoot River.

2. Ground Water

Draining perched water bodies in Rasmussen Ridge could dissipate soil moisture that now sustains vegetation.

b. Water Quality

If erosion of the dump provides suspended material to Angus Creek, the concentrations of some dissolved constituents might increase to a minor extent. The Rasmussen Ridge mine will contribute sediment to Angus Creek, Sheep Creek, Lanes Creek, and the Blackfoot River.

In the North Fork of Angus Creek from the headwaters to the confluence with Angus Creek, sediment loads are predicted to be 2½ to 5 times the present conditions. The present rates are considered to be very low; during and after mining, the rates are considered to be low to moderate. This is expected to cause an increase in the small-sized sediments deposited on the stream bed in pools, beaver ponds, eddies, and other slack waters. North Fork of Angus Creek is tributary to Angus Creek.

The Forest Service estimates that sediment loads in the reach of Angus Creek from the headwaters to the confluence with the north fork of Angus Creek, increase from 1¼ to 1½ times the present loads. This is a minor increase in sediment loads.

Sediment loads in Angus Creek from North Fork of Angus Creek to the National Forest boundary are estimated to increase during mining by 6 to 12 times the present sediment loads, and then to decline after mining to 3½ to 7 times the present sediment loads. The predicted loads are considered to be moderate to high during mining and low to moderate after mining. This increase in sediment is likely to cause increased deposits of fine sands and silts throughout the reach length. The existing gravel beds are likely to be sedimented.

Sheep Creek from the South Fork of Sheep Creek to the National Forest boundary is expected to increase 1½ to 3¼ times the present conditions during mining. After mining, sediment loads are expected to decline to 1¼ to 2 3/4 times the present sediment loads. The present conditions are considered to be very low; and during and after mining very low to low.

The estimated sediment yields in Lanes Creek from Sheep Creek to Diamond Creek during and after mining are less than 1½ times the present conditions. The increases are insignificant.

In general, the Rasmussen Ridge mine will likely have a negligible effect on sediment in the Blackfoot River.

3. AIR RESOURCES

The proposed mining on Rasmussen Ridge will create small amounts of particulates in the air.

4. VEGETATION

Mining will progressively remove vegetation from 321 acres, of which about 240 acres are sagebrush-grass, and 80 acres are conifer-aspen.

5. WILDLIFE

About 150 acres of deer, elk, and moose habitat will be destroyed. As many as 50 deer, 25 elk, and 8 moose will be lost. Migration routes will be restricted. An elk-calving area will be lost.

Considerable numbers of blue, ruffed, and sage grouse will be displaced from strutting grounds and nesting areas.

Sandhill cranes will be displaced from habitat that is also suitable for whooping crane nesting and rearing.

6. FISHERIES

As all streams draining the Rasmussen Ridge site are ephemeral, they support no fishery. With proper sediment control, the mining area should have little effect on Angus Creek.

B. CULTURAL ENVIRONMENT

1. AGRICULTURE AND RANGE

Forage will be progressively removed from 321 acres of rangeland with an estimated average annual production of about 400 to 800 pounds of usable forage per acre, air dry weight. During the life of the mine, as many as 175 AUM's, valued at $1,040 annually, will be lost on at least part of the site; some additional forage may be lost on adjacent lands. Actual loss is likely to be somewhat less during the first several years of mining, because grazing could continue north of the conveyor (fig. 11-6).

2. SOCIOECONOMIC DEVELOPMENT

The proposed mine will employ about 60 people when fully operational. The social and economic impacts at the site will be minimal and, by themselves, not significant, but the cumulative effect of this and other mining proposals will significantly impact the regional socioeconomics, as described in Part 1.

3. TRANSPORTATION AND UTILITIES SYSTEMS

Mining will restrict or prevent use of primitive roads that provide access to the minesite and surrounding area. Such roads include the Rasmussen Valley road, the Rasmussen Ridge tie, Sheep Creek road, Angus Creek road, and Little Long Valley road.

4. RECREATION RESOURCES

The proposed Rasmussen Ridge mine will moderately impact recreation resources. Reduction of wildlife habitat will reduce hunting opportunities. Hiking, horseback riding, and ORV uses will decline. Mining disturbances and related activities will reduce all recreation opportunities to low or very low levels.

5. ARCHEOLOGIC AND HISTORIC VALUES

Impacts cannot be assessed because it is not known whether archeologic sites exist on the areas. No surveys have been made.

6. AESTHETICS

Impacts will be high. The site is in the middleground viewing zone of the Lanes Creek and Enoch Valley roads. Travelers using the Diamond Creek road will also have an extended view of the mine.

CHAPTER IV
MITIGATING MEASURES

This chapter discusses mitigating measures for the Rasmussen Ridge site. Mitigating measures that apply to both the Wooley Valley and Rasmussen Ridge proposals are discussed in Part 11.1, Chapter IV. These shall be required at this site.

The following proposal for mitigation of impacts is taken directly from Stauffer's mining plan for the Rasmussen Ridge site.

Erosion will be reduced by retaining as much vegetation as possible and by preserving and maintaining present drainage patterns. Topsoil will be stockpiled for later reclamation. Disturbed areas will be seeded as soon as possible, using grasses and methods compatible with the area and the conditions. Interceptor ditches or berms will be constructed above backslopes; erosion-control gutters will convey runoff into drainage channels; and culverts and drains will be designed to adequately pass maximum anticipated runoff. Dump slopes will range from 2:1 to 5:1. The steeper slopes will be compacted after seeding.

The top of the waste dump will be sloped to direct runoff into collection areas behind the dump. Brush barriers will reduce runoff velocities and serve as a silt-retaining and deposition device. Twelve or more dikes will be built to form siltation ponds to prevent downstream movement of silt. Dikes will be seeded as soon as they are built. Backfilling will be graded to contour the surface for drainage into existing patterns. Water quality and stream discharge will be monitored and compared with premining condition. After mining is completed, ramps will be diked off; hazardous slopes will be fenced; and ditches, brush barriers, and haul roads will be smoothed and seeded. Equipment will be removed, and parking lots, roads, and surge-pile areas will be plowed and seeded. Sediment ponds will be used to reduce the sediment entering downstream waters.

A further site-specific mitigating measure could be required for the Rasmussen Ridge proposal. The impact on the transportation system could be mitigated by constructing the proposed railroad system, as discussed in Part 3, to replace the proposed haul-road for ore transport. This would reduce the number of mining personnel at the site, and mining-related traffic on the roads.

Additional hydrologic data should be collected for proper design of water-control structures.

CHAPTER V
ADVERSE EFFECTS THAT CANNOT BE AVOIDED

At either level of mining, changes in the land surface are unavoidable (fig. 11-9). Mining will create 191 acres of pits and 29 acres of dump. Backfilling will reduce these areas. Soils will be disturbed on 321 acres.

The retention ponds above the haul road may not be large enough for adequate settling time of sediment or they may rapidly fill with silt; sediment may thus get into Angus Creek. Seasonal runoff also may carry sediment to Angus Creek, increasing its turbidity. If mitigating measures prove ineffective, impacts may be moderate to high.

Vegetation will ultimately be removed from 321 acres, with about 125 acres cleared at any one time during most of the life of the mine. Annual forage production on 300 acres of reclaimed land will probably not exceed 300 to 1,200 pounds per acre, air dry weight--about half the present value. Production on 21 acres of unreclaimed pits will be lost.

The ecology of the mine area will be disrupted during mining. As many as 25 elk, 50 deer, and 8 moose, and other animals will be displaced, and their movements will be restricted. Habitat for gophers, ground squirrels, mice, and other small rodents will be altered, reducing prey species for raptors.

Breeding, nesting, and brood-rearing habitat for forest grouse and sage grouse will unavoidably be altered. Displacement of some sandhill cranes through alteration of habitat cannot be avoided.

Forage will ultimately be removed from 321 acres of rangeland. Average annual production of usable forage on about 300 acres of reclaimed land will probably not exceed 200 to 400 pounds per acre, air dry weight; forage on 21 unreclaimed acres will be almost totally lost.

The proposed mine will be high on a ridge and thus will be visible for miles. Outdoor recreation opportunities, expecially hunting and ORV use, will be significantly reduced.

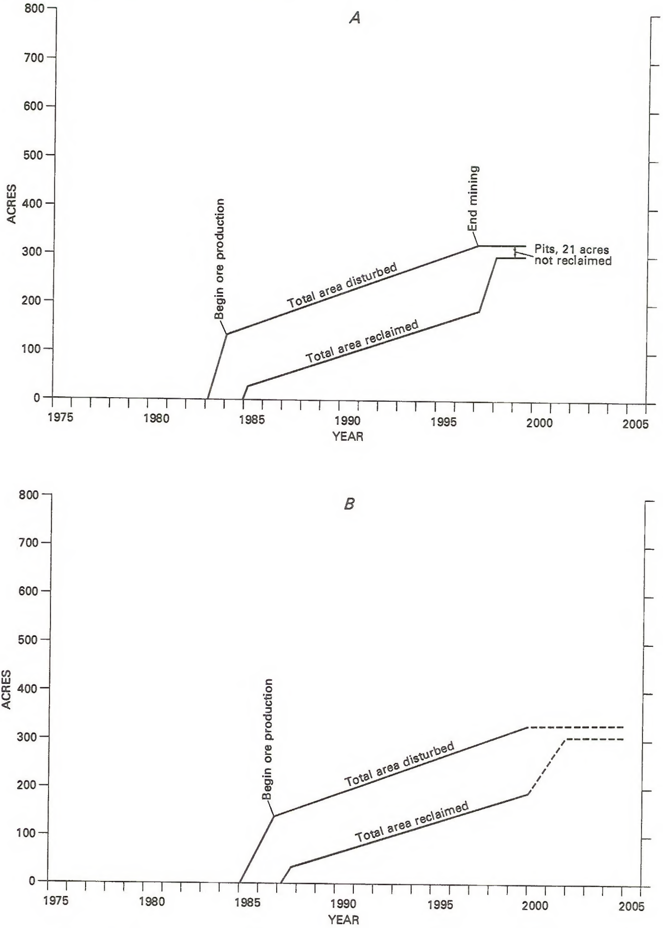

Figure 11-9.—Land disturbance and reclamation, Rasmussen Ridge site. *A*, Based on mining plan as submitted for approval. *B*, Based on revised level of mining.

CHAPTER VI
SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

At either level of mining, about 16 million tons of phosphate rock will be removed from the site and transported to Montana and Wyoming for processing into fertilizer. During mining, soils will be disturbed on 321 acres, and 29 million cubic yards of overburden and bedrock will be moved.

Dewatering pits during mining will lower ground-water levels near the mines and increase surface flows and decrease water quality in Angus Creek. There will be local short-term lowering of air quality from dust and vehicle emissions.

During mining, vegetation will be progressively removed from 321 acres; forage production of 600 to 2,400 pounds per acre, air dry weight, will be lost on about 125 acres at any given time. Wildlife populations will be disrupted. As many as 50 deer, 25 elk, and 8 moose will be displaced to adjacent ranges. Fisheries in Angus Creek will be affected, but to a limited degree. On the minesite, as many as 175 AUM's of forage, valued at $1,040 annually, will be lost during mining, because part of the site will not be available for grazing, The aesthetics of the area and its recreation resources will be reduced by the mining.

Long-term productivity of the area will be decreased. Annual forage production on 300 acres of reclaimed land will probably not exceed 300 to 1,200 pounds per acre, air dry weight--about half the present value. Production on 21 acres of unreclaimed pits will be lost.

Some long-term reduction in game herds--especially elk, deer, and moose--will result from competition on nearby ranges from the displaced animals.

Average annual production of usable forage on 300 reclaimed acres will probably not exceed 200 to 400 pounds per acre, air dry weight. Production on 21 unreclaimed acres will be virtually zero. On the entire site, average production of usable forage of about 90 AUM's valued at $530, will be lost annually.

The original condition of the land and its aesthetic resources will not be fully renewable after operations. The mining will have long-term effects upon the aesthetic character of the area by conflicting with the natural remoteness and contrasting with natural scenery.

CHAPTER VII
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

About 16 million tons of phosphate rock will be mined and processed by Stauffer. This is irretrievable. This ore contains 380,000 tons of fluorine, 13,000 tons of vanadium, 1,800 tons or uranium, and 16,000 tons of rare earths, which will be removed but not recovered. The landscape change through creation of dumps and pits is largely irreversible. The mixing of soils and attendant reduction of productivity on 321 acres is irreversible. Loss of wildlife, to the extent that it cannot successfully relocate, is also irretrievable. The remote, undeveloped character of the area will be irreversibly and irretrievably committed to further intrusion of mining-related changes.

Mining and reclamation will require 4 million gallons of diesel fuel, 640,000 gallons of gasoline, and an unknown amount of lubricants, explosives, and electricity.

Assuming that a third of the ore is shipped to Silver Bow, Montana for processing into elemental phosphorus, about 5.9 billion kilowatt-hours of electricity, 21,000 gallons of gasoline, 600,000 tons of coke, 750,000 tons of silica, and 15,000 tons of carbon electrodes will be required.

Beneficiating the remaining ore at Leefe, Wyoming will require 84 million kilowatt-hours of electricity, 43,000 gallons of gasoline, and 52 billion cubic feet of natural gas. Processing into fertilizer will require 600 million kilowatt-hours of electricity, 43,000 gallons of gasoline, and 9 million tons of sulfuric acid.

Transporting the ore by rail to Silver Bow and Leefe will require about 12,6 million gallons of diesel fuel.

CHAPTER VIII
ALTERNATIVES

This chapter discusses alternatives that apply specifically to the Rasmussen Ridge proposal.

The general administrative options available to the Secretary of the Interior are discussed in Part 1. Rejection of the Rasmussen Ridge proposal would have no immediate effects, since production is not planned until 1982. Rejection after 1982 would prevent immediate impacts on Rasmussen Ridge.

The following are alternatives to the proposed mine plans. Stauffer proposes partial backfilling at both sites. The alternative of replacing all the waste would probably nearly fill the pits, but dumps would remain. Stauffer proposes to haul ore by scraper to a conveyor, which will transfer the ore to trucks for a 5-mile haul to the present Wooley Valley conveyor. A proposed alternative is a railroad spur from the Rasmussen Ridge conveyor. Alternative rail routes are discussed in Part 3. If the railroad serves Alumet's proposed Diamond Creek and Lanes Creek mines as well as the Rasmussen Ridge mine, the Long-Wooley-Rasmussen Valley spur would probably have less impact than a separate haul road; the alternative rail route through The Narrows would have more impact on water quality, wildlife, fisheries, recreation, and aesthetics than the proposed haul road.

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